FLYING THE ARCTIC

CAPTAIN GEORGE H. WILKINS

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CAPTAIN GEORGE H. WILKINS

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BY

CAPTAIN GEORGE H. WILKINS

WITH 15 ILLUSTRATIONS

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FLYING THE ARCTIC

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by
George H. Wilkins

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Now faith is the substance of things hoped for, the evidence of things not seen.—Hebrews 11:1

FOREWORD

PEOPLE often ask me why I go to the polar regions.

I doubt if any one of us can say, in so many words, just why we do this or that or the other. I might fill volumes telling why I go to the Arctic or the Antarctic, yet the man who "doesn't know" would not understand.

But I can tell what there is to be done and what I expect to do in these regions.

From evidence collected many years ago scientific meteorologists deduced the theory that data collected in polar regions and correlated with meteorological information from other latitudes would enable us to forecast the seasons with comparative accuracy.

The maintenance of polar meteorological stations during recent years has proved that there is a direct relationship between the Arctic, the Antarctic and subsequent conditions in the great producing areas of the world.

FOREWORD

It is advisable, before commencing the investigation of polar meteorology, to locate the most suitable points at which to establish the meteorological stations. These stations, when established, could also be the centers from which many other observations of scientific interest might be carried out.

While it is not yet possible to guarantee the accuracy of long-range weather forecasting, it is the opinion of modern scientists that if a sufficient number of polar stations are maintained present day synoptic, or day to day, weather forecasting can be improved at least fifteen percent. Even this advantage would justify the expenditure necessary to maintain many meteorological stations in the polar regions. The science of meteorology is closely allied to the science of geography and it is necessary to complete the geography of the world before it is possible to select the most favorable sites for meteorological observations.

It is essential in these days—in order to keep abreast of the times—that we think in world proportions. This applies not only to meteorology but to transportation as well. Through a study of world meteorology we can hope to provide information of extreme value to primary producers and so help feed the ever increasing population of the world. At the same time and from the same source, we could aid air-travellers who will be taking advantage, in the near future, of the whole world's surface—of latitudes far above the polar circles and of altitudes far above the mountains and the seas.

Since the beginning of history, mankind has been concerned with and greatly influenced by the weather, but it is only now and since the development of modern science has brought about long-distance communication by means of wireless and speedy transportation by means of aircraft, that we can expect to carry out and make use of observations which might give us some information as to the mechanism that governs the winds.

If a close study of universal meteorology provides the information expected, then it will be possible to eliminate the suffering of hundreds of dumb animals which each drouth-year die of starvation and thirst and, incidentally, prevent the ruination of thousands of hardy pioneers who periodically lose their homes and fortunes because of unexpected drouth conditions. The stock die and the men suffer, not because of the cruelties of nature but because man has not yet learned the fundamental laws which govern the universe.

If a knowledge of the weather system can be gained, then we can, on long distance flights by aircraft, expect to take advantage of the wind instead of being at its mercy, as we are now.

Three years ago, when we first planned the Detroit Arctic Expedition, there were still two unexplored areas from which we needed observations. One area lay in the Arctic Ocean northward from Point Barrow. It was the object of the Detroit Arctic Expedition to explore that area.

There were many things of interest which might at the same time be accomplished. It was pointed out by Vilhjalmur Stefansson that we might, while in the Arctic, demonstrate to the world the advantage and practicability of trans-arctic transportation—show that by going over the top of the world we would find shorter routes than those now followed on a round-the-world course. Stefansson did not mean by this that the trans-arctic routes should necessarily cross the Pole itself, but he believed that flyers would soon take advantage of the fine weather conditions and short distances to be found on routes passing beyond the Arctic circle.

FOREWORD

For three years we have battled against a variety of conditions; against apathy, against over-enthusiasm, against tragedy, fear, superstition, derision and distrust, yet perhaps these were the goads needed to stimulate our faith.

We begged for money, bought machines, flew them and smashed them, rebuilt them and smashed ourselves. My crooked arm and Eielson's missing finger are mute evidence of trials endured. But we saw the job to be done. No man drove us to it, but there is no harder taskmaster than the "will to do it."

With Carl Ben Eielson's aid and the help of many sympathetic and generous friends we have completed the work we planned to do in the Arctic. This does not mean that we have completed all the work to be done in the Arctic. No, not by any means. There is still much work of exploration to be done in the high northern latitudes, but we have done that part of particular importance to our meteorological program.

There still lies in the Antarctic a great unexplored area. We have set ourselves the task of finding out what lies along the southern shores of the Pacific Ocean, to learn something of the land between the Ross Sea and Grahams Land.

For Eielson's help with the work in the North

FOREWORD

I am extremely grateful. There is no person, whom I know, with whom I would rather work.

For Vilhjalmur Stefansson's advice and encouragement I am also grateful. My thanks are due to many people, far too numerous to mention here, but I must mention the help I have received from Lura B. Shreck, who has with such painstaking care helped me with the manuscript of this book.

George Hubert Wilkins

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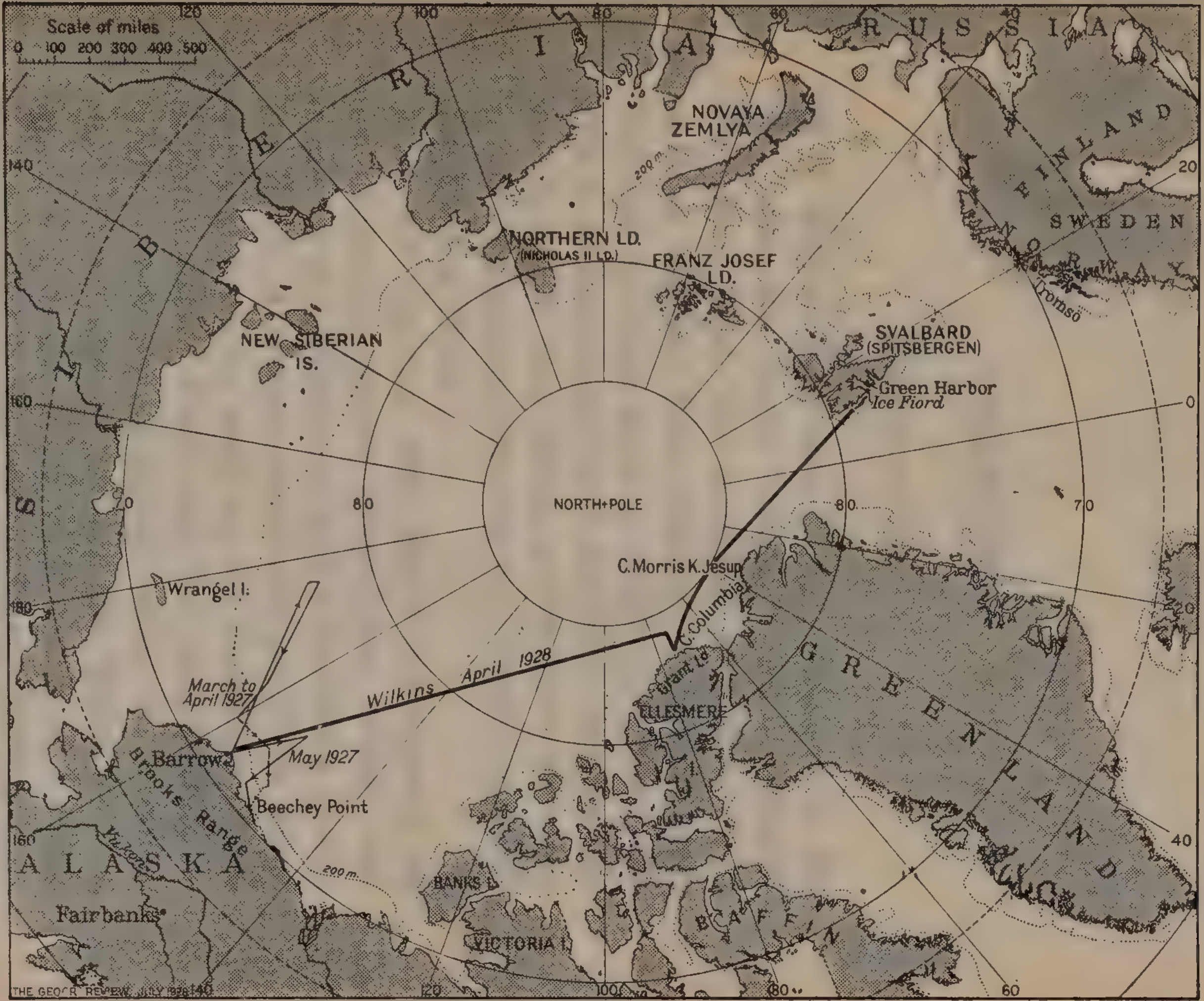
FLYING THE ARCTIC

PART I

TRAGEDY



THE GEOG'R. REVIEW, JULY 1928

CHAPTER I

LOOKING AHEAD

IT was in 1913 that I first proposed to fly over the Arctic Ocean. I had no thought then that the machines available could make a crossing from Barrow to Spitsbergen. But even in those days, it would have been possible to make a sortie with airplanes into the unknown Arctic area, seeing as much new territory in one day as could be seen on a twelve months' trip by dog team.

My lot was cast with Stefansson's party on his Canadian Arctic Expedition, which was made up of a Northern and a Southern group. Dr. R. M. Anderson was in charge of the latter, which planned to work on the Canadian Coast, in Amundsen's Gulf and the neighboring islands. Stefansson's group, under his personal supervision, was to explore the Beaufort Sea, which lies in the great bight north of Canada and immediately west of the Parry Archipelago.

Early in our efforts, and soon after rounding Point Barrow, the main expedition ship, the *Karluk,* became fast in the ice. Six of us, including Stefansson, became separated from the ship, which drifted to its doom. Some of the crew were saved, but many of them perished, either on the way to Wrangel Island, or after they reached there.

Those of us marooned on the ice had to travel many miles by dog team. We followed the coast first to Barrow for assistance, and later went eastward to join two other boats of the expedition. Early in my Arctic experience, I learned what is meant by "living off the country"—which is simply living on the proceeds of hunting. And from Stefansson, I found out how to take care of myself under Arctic conditions. For many miles we travelled along the Arctic Coast and across the Arctic pack, crossing leads of open water, hauling on the sleds, running in front of the dogs and living as did the dogs on food we procured with the aid of our guns. It was a romantic, hard, yet not unpleasant life.

I was born and raised in the wide, thinly-populated areas of Australia, where even the poorest man's dignity demanded that he should not travel afoot, so that when I joined Stefansson's Expedition I was unaccustomed to working and disliked walking. Several years spent in travelling in Europe and America had familiarized me with all modern modes of travel—balloons, airships and airplanes. I had learned, when flying with my friends, during the years of 1910 and 1912, to handle an airplane fairly well, but had not received my pilot's license. When faced with a several-hundred mile journey, as I often was while on Stefansson's Expedition, it was not surprising that my thoughts turned to the possibilities of air travel in the Arctic.

I did not enjoy following the dogs or running ahead of them over the soft, spring-thawed snow or wandering along ice-strewn beaches during the long winter darkness. My feet were unused to the soft, flatsoled skin boots, my ankles ached and muscles swelled. My eyes ached from eye strain and it was not a rare thing, in going ahead of the dogs picking the trail, as was usually my job, to suffer the excruciating pains of snow blindness. I liked to imagine I was up in the air, sailing along in an airship or an airplane with the broad panorama of ice beneath me. Is it any wonder that I should often say to Stefansson, "We should give up this old-fashioned mode of travel, go back and get airplanes with which we could cover in one season all the work you have planned to do."

But Stefansson had less faith than I in the possibility of doing serious work with the aid of an airplane in the Arctic. His method of travel was romantic and slow but sure, and enabled him to make sound and thorough scientific investigations, whereas an airplane trip would be but a reconnaissance.

For five long years he plodded on, advancing new methods of Arctic foot-travel, using them successfully and making many discoveries of importance. My first term of Arctic service lasted three years. During that time I walked not less than five thousand miles over the Arctic ice, probably much more, and laid up under Stefansson's expert direction a store of Arctic experience that has stood me in good stead ever since.

In 1919, I made an effort to obtain a dirigible in which to cross from Spitsbergen to Alaska. Although sufficient money to finance the trip was available, not one of the owners or manufacturers of airships in England would either sell me a dirigible or allow me to use one for that purpose. They thought the idea fantastic. Yet, I was as certain then as I am certain now, that any one of the dirigibles then in England could have made the trip successfully.

It was not until 1926 that I had my first opportunity to use aircraft in the Arctic. By that time, airplanes had proved their usefulness in conditions much more rigid than those experienced during an Arctic spring. In North Russia, Norway, Sweden, Canada and Alaska, they were used the whole year through. Amundsen and Ellsworth had, on their flight to within a hundred miles of the Pole, proved that airplanes would function perfectly in the Arctic. They had used flying boats and had difficulty. Yet with greater experience of the Arctic pack, they would have known that the use of flying boats would lead to trouble if landings were necessary. But while in the air, their machines functioned perfectly. They clearly demonstrated that airplanes could be used.

Yet Amundsen insisted that not for many years could airplanes serve in Arctic exploration. Byrd, from his base at Etah, Greenland, had covered nearly five thousand miles of flying during the latter part of an Arctic summer. He realized that airplanes would function successfully in high latitudes and later proved it conclusively by flying so brilliantly from Spitsbergen to the Pole and back. Ben Eielson, in the depths of an Alaskan winter, had used planes for carrying mail, and for transporting sick and suffering prospectors from outlying posts. These men would have suffered untold agony, if not death, had not the airplane come to their aid. Yet many people still thought that successful flying over the Arctic was impossible and that accurate navigation of aircraft over the Arctic Sea was entirely beyond the bounds of reality.

Frustrated in an attempt to purchase Amundsen's N. 25 for Antarctic exploration, it was too late in 1925 to have another suitable machine built in time to go to the Antarctic that year. So I turned my attention to the Arctic. One must fly in January to cover the work I wished to do in the South polar regions and leave New Zealand not later than November. To take advantage of the best weather conditions, it would be advisable to work in the Arctic during late March or April. I hoped, therefore, that I could make a hurried trip into the Arctic, fly out a few times from Barrow into the unknown regions and return in time to take up the Antarctic work the same year.

With that purpose in mind, I determined to visit America and make arrangements. I had some money of my own. Kind friends in England and Australia supplied some more, and in all I had more than fifteen thousand dollars available. Not a great deal, but it was enough to purchase a machine fit to do some useful work. Just fifty miles north of Barrow was the edge of the unexplored region. A machine with a range of even six hundred miles would enable us to do more work in a season than explorers travelling on foot could accomplish in many years.

A machine with a twelve hundred mile range would enable me to investigate the area in which I was particularly interested and discover whether there was north of Barrow any land on which we might establish a meteorological station.

I hoped to augment my funds by an arrangement with some newspaper organization, and in New York I found that this was possible. I proposed to take only one machine, adequate spares, one pilot and a mechanic, and with the minimum of expense, to make two or three short flights into the unknown area, and come down and take soundings if new land was not seen. Previous experience with big expeditions had warned me of the difficulties of handling large parties of specialists, each believing that his interests or those of his particular branch were the most important. I believed three or even two men could do all that was reasonably possible. When all is said and done, the navigator and pilot would have to do the work. But they don't do things that way in America.

For the news-rights of an airplane expedition, the North-American Newspaper Alliance was willing to provide twenty-five thousand dollars, besides the cost of collecting and forwarding despatches, and through their efforts I was offered further support in the city of Detroit. But my greatest satisfaction lay in the fact that Dr. Isaiah Bowman, of the American Geographical Society, was impressed with the sincerity of my purpose. Through his good grace, the expedition was endorsed and aided by one of the greatest scientific societies in the world. This fact, I am sure, made possible the support we gained from many people in Detroit.

Stefansson's help was invaluable. He was a man who knew me and knew the Arctic conditions. Since our early discussions, he had learned much about airplanes from his friend, Orville Wright. He was confident that with their aid, some useful work could be done and that sooner or later they would be used for trans-arctic transportation.

With the help of Mr. Loring Pickering, then manager of the North-American Newspaper Alliance, and Mr. George Miller, then editor of the *Detroit News,* things moved quickly, but not to my entire satisfaction. Our supporters in Detroit—many of them multi-millionaires—offered substantial assistance, and insisted that we operate on a much larger scale than I believed was necessary. We must have two if not three planes, mechanics, superintendents, photographers, newspaper-correspondents, wireless operators, and assistants, a supporting party to depot our supplies, spare pilots, and a host of other things, to my mind quite unnecessary. Naturally, these things might come in useful if we could afford them, but they seemed to me to require uncalled-for expenditure.

It was decided to appoint, first, a Board of Control in charge of plans and management; then, a committee of aeronautical engineers to select our equipment; a finance committee to provide and handle funds; a manager; an assistant-manager; a secretary and treasurer; and a staff to handle the details of transportation, supplies—a whole string of trained associates quite foreign to the needs of an Arctic expedition by airplane. The result was a cumbersome, disjoined arrangement. In spite of the energetic efforts of H. G. McCarroll, the young, vital assistant-manager upon whose shoulders the brunt of the details fell, the business affairs of the Detroit Arctic Expedition were a hopeless muddle.

Fortunately, very early in the history of the expedition, I fell in with Lieutenant Carl Ben Eielson, a pilot who had been flying in Alaska, and who really believed in the possibility of airplanes functioning under Arctic conditions. He had had no actual polar experience, and was not keenly interested in Arctic exploration, but he was interested in flying in the Arctic. In Eielson, I recognized a man who would trustfully serve our purpose and a man capable, dependable and companionable. I took his skill as a pilot for granted. He held an army-pilot's license, and had flown for many hours in many types of planes.

I had previously learned that there were at least two hundred and fifty gallons of airplane gas available at Barrow. With what we could carry in our plane from Fairbanks on one or two ferrying trips, we would have enough to do two or three thousand miles of flying over the Arctic ice, and with that I would have been satisfied. I did not realize then what a load the extra machines and men would be. I was convinced that with Eielson and perhaps a mechanic and one good reliable machine, we could do all that I needed to do; and as a matter of fact I cared little what else or how much more we had available if only that amount of assistance was forthcoming.

The Board of Control and my friends were anxious that we should attempt a trip right across the Arctic Ocean. I was not keenly interested in this because such a trip would mean crossing many miles of territory already explored. It was my desire to spend all my energies and take whatever risks were necessary to cover only unknown conditions. However, it was agreed that when we had concluded as much real exploration as possible, we should, as a culmination to our efforts, attempt a flight from Barrow to Spitsbergen.

The matter of equipment was ostensibly left to the Select Committee of Detroit Engineers. But long before they had come to a decision, I had ordered two Fokker monoplanes; one seventy-two foot wing to be fitted with three

Wright Whirlwind engines, and one sixty-three foot wing which was already fitted with a special Liberty engine. The larger of the two was ordered and shipped from Holland, arriving in New York on the very day the Detroit committee at last agreed that the Fokker machines were the best for our purpose. They had been anxious, and rightly so, to use American-built machines, but there was none of American manufacture available at that time.

Anthony Fokker, the world-famed designer, was my sincere friend and supporter, and this preliminary work was done with his aid. I had met him in Detroit at a meeting when our plans were first mentioned. I had previously examined his machine, and his factory, and had already determined to use his machines if he would agree to sell them for that purpose. Not having ridden in, or flown his three-engined machine which at that time was creating a great deal of interest in American flying circles, I was happy on the afternoon we first met to fly in the trimotored monoplane with Mr. Fokker. He expressed great interest in my project.

We travelled together to New York that night, and before we reached our destination, he confided to me the fact that he was building a new, large-wing monoplane in his Holland factory. "With that machine," he said, "I believe you can do all you want to do in the Arctic Ocean and then fly to Spitsbergen. If you can find your way, and if you do get there, I, myself, will come and fly the machine from Europe to America. We will bring the plane at once from Holland, and if those Detroit men won't stand behind you, I will provide the machine." It was a most generous offer. I was, and am still most grateful to Mr. Fokker for his support. His machine was secured, and I think there never was and that there is not even now, another machine of its size in the world so well made, or efficient as the large Fokker monoplane.

CHAPTER II

CHEERS AND JEERS

THE Finance Committee of the Detroit Arctic Expedition promised to provide eighty, ninety or a hundred thousand dollars if necessary. With what the North-American Newspaper Alliance gave and my own fifteen thousand dollars, we had forty thousand dollars. Thus it appeared there was no need to worry about money matters. "We are in the job to do it," Detroit men said. They thought the time of preparation was too short. Other polar expeditions had spent months and months; some, years in preparation.

More than one of our supporters exclaimed at various meetings, "What difference if we don't do the job this year? You go and gain experience, test the equipment, and the work can be done next year or the year after if necessary." But I already had all the Arctic experience necessary to navigate or walk home if need be. The designers had produced reliable planes and engines, and I trusted the skill of the expert pilots to fly them. Except for temperature, the air would be similar above any degree of latitude. Temperature conditions would be taken care of in equipping the planes.

The work was continued the next year and the year after, but not with the continued help of all the men on our committee. I learned later that they had not understood my point of view at all. What they were interested in was a spectacular dash from Barrow to Spitsbergen over the top of the world, brushing the Pole itself aside as we passed.

Yet, our object was clearly stated on our printed stationery: "It is the purpose of the Detroit Arctic Expedition to explore that area of the polar ice-pack never before seen by man."

The work of collecting money went on apace, in a manner much against my wishes, for I had seen such methods fail in other countries. It was decided to make a public appeal to the people of Detroit. It is to the credit of the Finance Committee's efforts that more than eighty thousand individuals subscribed to the funds of the Expedition. But many of the subscriptions came from school children, who were not permitted to give more than five cents each. Although this amount from each scholar gave him the right to have his name inscribed on a monument to be erected, if we were successful, we were soundly rated by some for extracting for our personal use money from defenseless infants.

Although the subscription list contained many names, the total amount subscribed, when it became necessary to pay for the equipment, was far below the requirements. Several of our most enthusiastic supporters then most generously signed a note and borrowed from a bank the necessary funds, hoping that their friends would stand by them and help raise the amount to liquidate the loan. In this they were disappointed. It would be invidious for me to mention the names of those who signed the note or those who bore the brunt of the campaign for money, since the total list of subscribers is too long to publish. [Below will be found a list of the officers of the Expedition, the Board of Control and the principal members of the Detroit Aviation Society.[1]] My very deepest

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[1] OFFICERS

Edward S. Evans, General Manager.
H. G. McCarroll, Assistant Manager.
Charles T. Bush, Treasurer.
George H. Wilkins, Expedition Commander.

LIEUTENANT CARL BEN EIELSON

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THE FLAGS OF THREE COUNTRIES TRAVEL THREE YEARS personal gratitude is to those men and others for their aid at the outset of our enterprise. That they were not individually asked to contribute to the support of the second and third years' efforts is not necessarily because they would have refused. I was grateful for their first aid and content to trouble them no further.

The gracious act of the men who signed the note enabled us to have our full equipment ready and to leave on schedule time. I had set February thirteenth as the latest date for leaving Seattle. It was imperative that we reach the North

---

BOARD OF CONTROL

William B. Mayo, Chairman.
Isaiah Bowman.
Harold H. Emmons.
Edward S. Evans.
William A. Mara.
Loring Pickering.
Vilhjalmur Stefansson.
George H. Wilkins.
H. G. McCarroll.

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William B. Mayo, Pres.
Col. Jesse G. Vincent, First Vice-pres.
Howard Coffin, Sec. vice-pres.
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Paul Strasburg
Ralph H. Upson
Sidney D. Waldon

in time to carry out our work in April. If we were to succeed, we must freight our supplies and equipment to Barrow in March. I think very few at that time realized how important this was. Most people were inclined to believe that the temperature during the latter part of the Arctic winter would be too severe to permit us to work with airplanes. I knew from actual experience and knowledge of Arctic meteorology that it was possible to fly in low temperatures and essential to do our work early in the year, when good visibility prevailed. Later on obscuring fogs would rise above the Arctic snows, making accurate navigation impossible, and absolutely preventing exploration. Even though we may fly above we cannot see through the clouds to the unknown areas beneath.

The machine from Holland arrived at the Atlantic Aircraft Corporation Factory about the first of the year. Due to the energetic and thorough methods of Mr. Noorduyn, the General Manager, our two machines were perfectly equipped and packed for transport. Before the first of February they were forwarded by rail to Seattle. Our only regret was that there was not a suitable field near the factory from which to carry out tests. Even twelve months later, Commander Byrd's Atlantic machine came to grief during a test on the field available at Hasbrouck Heights.

However, no matter what tests we might have carried out under the rain-soaked conditions in New York State, we would be required to make them all over again when we reached the low, dry temperatures of Alaska. Every flight from a small field was a hazard. I preferred to limit the hazards to a minimum.

There was no doubt about our pilots' experience in flying over snow conditions. Eielson had been flying over Alaskan snows for years. Each year, for several years, Major Lanphier, Commandant of the First Pursuit Squadron of Selfridge Field, and who had obtained leave to accompany us, had with his Squadron gone to northern Michigan to spend a week or so flying over snow. He had used skis on airplanes and had worked in low temperature conditions. Immediately before we started, he had completed that work for 1926. Sergeant Wisely had accompanied him. Each pilot had flown many types of planes, both large and small.

There were few Fokker monoplanes then in existence, and almost as few pilots who had flown them. The pilots experienced on Fokker machines were either unable to go or unsuited for the work in hand. Sergeant Wisely of Selfridge Field was recommended by Major Lanphier and others as the finest and most efficient army pilot accustomed to large machines. He was an expert mechanic used to Liberty engines. It was Wisely who was invariably sent to bring home machines that had been in trouble and which had been forced to land. Wisely was especially efficient if conditions were difficult and the weather cold. His duties on the expedition would be to fly when necessary and particularly to take care of the Liberty engines.

Mr. Noorduyn generously promised to loan us Mr. Howard, a man who had been in their employ for many years. Howard neither desired to go, nor was he suitable for a pilot on an Arctic ice trip, but his experience with Fokker machines was alleged to be considerable. His duty was to lend his expert advice in assembly and test flights. Andrew Hufford, a man on the staff of the Wright Aeronautical Company, and with many years experience on Wright Whirlwind engines, was, through the generosity of the Wright Company, to join the Expedition and care for the Whirlwind engines. It seemed that there was absolutely nothing wanting in the merits of our staff. Each man had a job for which he was solely responsible, and each was considered to be an expert at his job. I was content to give each expert a free hand expecting that, with full responsibility, each would give the finest possible service. It was not publicly announced who would do the long-distance flying, but I had early made up my mind that Eielson was the best-fitted for that work. So long as he and I had a good machine and supplies at Barrow, I was confident that we could carry out our plan.

Eielson was sent to Fairbanks two weeks ahead of the others in order to prepare for our arrival. There was no time to get thoroughly acquainted with the men before we left. Under the circumstances, it did not seem necessary to do so. This was not my Expedition, it was the Detroit Arctic Expedition, and as such it was expected that every man should be loyal to Detroit interests, rather than to the individual commander in the field. Major Lanphier and I were the last to leave Detroit, the others preceding us to Seattle.

We left to the blare of trumpets, publicly bidden adieu by the Mayor at the City Hall, accompanied by him and a large brass band to the railway station. Thousands of people lined the streets, some cheering and some jeering as we passed. Two special newspaper correspondents were to accompany us and record our every move. For three weeks before we started there had been a whirlwind campaign for funds, a round of public lunches, dinners, banquets, and speeches—an orgy of publicity that would have surfeited a moving-picture star.

I would not have believed it possible that I could withstand the humiliation of accepting a luncheon in my honor and there and then plead for money. The greatest hardship I have ever suffered, and the most trying ordeal ever undertaken, was to address from time to time an audience of harassed business men on a subject in which they had not the slightest interest nor understanding, and then stand while some raucous-voiced, high-pressure salesman sold my photograph or my autograph for a hundred, fifty, twenty, five dollars, fifty cents, or what have you. I still shudder when I think of it. No one except myself seemed to mind it, and even those who were gypped a hundred dollars for my signature scribbled on a photograph, laughed it off.

Our publicity men were not satisfied with the hullaballoo raised in Detroit. We must visit a dozen towns in as many days, accept luncheons, dinners, banquets galore and talk of the things we hoped to do. From city to city we travelled in special coaches and compartments, faithfully followed by our two publicity men and the local scribes.

I was most interested to see the American cities and honored to meet many notable and excellent gentlemen, but all this preliminary bunk had long since got on my nerves.

All these things were done to help the Expedition. I am sure that not one of our associates could have been more helpful, kindly, earnest and generous. It was the manner, not the spirit of helpfulness that was strange to me.

When we finally arrived at Seattle, our planes were safely there. What with the Atlantic Aircraft Company's efficient loading and the railway company's care, they had crossed the continent in record time and arrived without a blemish. In order to facilitate loading, the Alaskan steamer drew up beside the railway wharf, and the huge wings and fuselages were safely placed on board, securely lashed, and were ready to greet the Arctic snows.

Everyone was most obliging and helpful. No one had found anything we asked too much trouble or expense. Everything was arranged for our comfort, convenience and entertainment, just as if we were important heroes freshly returned from some new conquest instead of men anxious and earnest in our desire for an opportunity to do something we believed to be of value.

It was not until we boarded the Alaskan steamer that all the members of the Expedition, except Eielson, came together and I had an opportunity to see something of them away from home and at close quarters. It took us about three days to reach the first port of call. By that time I had learned that three of the men, perhaps four, were entirely unsuited to our purpose. It was in my mind to return them at once, but they were men selected because of their expert knowledge, and it would be impossible to replace them on short notice. If they were left behind and things went wrong, defense of such an action would have been impossible, because I had only my opinion, not proof, that their services would be unsatisfactory.

It was not the first nor the last time I regretted the unwieldiness of our organization.

CHAPTER III

DISASTER

AFTER a smooth trip through the "inside passage" to Seward, Alaska, we were faced with the difficulty of unloading the huge monoplanes. A strong wind swept down from the high mountains and swirled about the railway sheds on the wharf. It was necessary to remove some of the shrouds of the boat to enable us to move the wings from the deck to the shore. The Alaska Steamship Company's officials were, as they had been from the start, very obliging, careful and efficient in their handling of our equipment. In spite of the gusty wind, the machines were unloaded from the ship and onto the railway trucks with only slight damage. One of the wings was caught in a blast and swung against the end of the steam-crane, but sustained only slight damage. Our two mechanics, Hufford and Wisely, were told off to accompany the freight train to Fairbanks, to give assistance where needed and keep an eye on the lashings of the load. Both passenger and goods trains reached Fairbanks from Seward in two days, and shortly after we arrived, our planes were with us. Eielson had made provisional arrangements for the use of the hangar and field belonging to the Fairbanks Airplane Corporation, and the morning after we arrived, we were busy unloading the machines.

The sun shone bright and clear. Those of us with Arctic experience knew the temperature was low, but none of us thought to look at a thermometer until returning to the town to lunch. Then we noticed that it was fifty-two below zero. All morning we had worked without any complaint and little inconvenience, for at Fairbanks, as at other places in the far North, a low temperature is rarely accompanied with wind, and when the air is calm, the temperature does not make one feel uncomfortable. When they saw how low the thermometer registered, the men unaccustomed to such low temperature began to feel the cold and declared that it was not right for any man to be asked to work in such frigid conditions. Without the thermometer they would not have known it was cold. However, they all worked well, and in two days, we had all the equipment inside the hangar.

It did not take long to assemble the machines. The workmanship in the Fokker Factory had been splendid. Everything was carefully arranged by them for our convenience. While the Fokker Company's expert was rarely in evidence at the hangar—his interests being neither in the direction nor in the participation of manual labor—we had no difficulty in getting the machines ready for flight.

The time came when both the machines were almost ready to take the air, and our newpaper representative, Palmer Hutchinson, was most anxious that we should create news by having them christened. He arranged for the attendance of a Catholic Priest, a Presbyterian Minister, an Episcopal Parson, and a layman to be present. He engaged the services of the Mayor's wife and a beautiful young girl, born in Fairbanks, to perform the ceremony of drawing flags from the nose of each machine and cracking a bottle of gasoline across their propellers. Most every man, woman and child in Fairbanks turned out to see the ceremony.

After prayers and speeches, and after the flags had been drawn and bottles cracked, and after the eleven special cameramen had hastened to the depot with their photographs, I proposed to put the three-engined machine in order and fly it. But there was such a crowd on the field that afternoon I was afraid that if we tried to get off, someone was likely to be injured.

I announced to the people that we would not be flying the machine for some time, perhaps not that day; and I suggested that, since the ceremony was over, they might like to get home out of the cold. Most of the people, if not all, followed the suggestion.

I have since much regretted that I did not keep to my first decision. After an hour or so, when the field was clear and the machine was in perfect readiness for flight with engines running, gas and oil in place, I felt that after all we might as well make a test flight that afternoon.

Our newspaper man was in the town busy writing his despatches. I did not care to go off without giving him notice, so I spent some time in finding him and telling him to come inconspicuously to the field. He would get a scoop for his paper. The other correspondents would be busy writing their despatches and not expect us to get into the air. Palmer Hutchinson dashed off a few lines, saying that we were about to fly that afternoon, handed them over to the telegraph operator, and came to the field.

He was a most pleasant and likable companion, clever at his work, but too anxious to be of help to everyone. Time after time he had been warned that his job was to look on and report what others did, not to do the work himself. Many times I had ordered him from the engine platform for fear he might come to harm, through his inexperience with airplanes. But he always insisted on doing a share of the manual work. This day was not an exception.

The three engined machine, which had been that day christened the *Detroiter,* was rolled from the hangar. It had only single controls. Major Lanphier was at the controls, and I sat by his side in the cockpit. The mechanics shouted "all clear," and we started to taxi to the runway. We went about a hundred yards and then stopped with the wheels against a soft snow bank. The machine at slow speed was difficult to steer. The mechanics and the few men standing by came running to our assistance. We had to stamp the snow in front of the wheels in order to get a start. The outboard propellers were directly in front of the wheels, and to clear the snow in front of them was a dangerous job.

Hutchinson was one of the first to reach us and attempt to clear the way. He carefully stamped down the snow. The sign, "all clear," was given, and Lanphier thrust the throttles open. The machine had scarely begun to move when we heard a dull, heartsickening thud. Lanphier, sensing trouble, throttled the engines down and then shut them off. I looked over the side and saw Hutchinson lying beneath the propeller. In the excitement of the moment, when the machine began to move, he had stepped right into the propeller instead of away from it. He was killed instantly.

Everyone with the Expedition, and I think every man and woman in Fairbanks, was more than usually grieved at this fatal accident. Palmer Hutchinson had been so well-liked. He was always with us, boisterously happy, joking, laughing, teasing or helping and comforting someone throughout the day. His career as a journalist had promised well. He was already well-known to the public as a splendid descriptive writer of sport items.

Until that time everything had gone splendidly with the Expedition. We were on schedule time, our machines seemed to be perfect, our supplies were all in readiness, and we looked forward to a successful operation. Hutchinson's death seemed to throw a blight on the whole performance. Some of the men became dispirited, but a few of us realized that now, more than ever, should our efforts be untiring and eventually successful. Our operations had brought about the death of one of our number. We must atone by making our success a monument to his memory.

Because of the difficulty we had experienced with the soft snow about the hangar, it had to be cleared from about the buildings and on the field. The snow in Central Alaska is dry and sugary. It cannot be rolled or packed without great difficulty. Our machines fitted with wheels would travel through it, but steered awkwardly. Once we arrived at Barrow, we would have no trouble; the snow there in late winter and early spring was hard and wind-driven. The wheels with a light load would not cut into it.

I proposed, for the take-off on long flights from Barrow, to clear the snow, cutting gutters just wide enough for the wheels and the tail-skid, thus making tracks on the smooth level ice for as long a distance as we needed. Because of making many take-offs and landings at Fairbanks, I felt we should clear a runway one hundred and twenty feet wide and as long as the field would allow. We hired teams and tractors, snow ploughs and snow-shovels, in fact used every means available regardless of expense to clear the field as soon as possible.

Major Lanphier's help in this, as in everything else connected with the Expedition, was splendid. He was with me always, the first and the last to leave the field of operations, slaving like a navvy, giving good advice and cheering the men. Lanphier has the faculty and training which makes him an expert at handling men, and without his aid I should have been badly off.

It is not my inclination to directly govern and order men about, especially on a small expedition, where every man on the staff is a specialist and working for the expedition's interest, not for an individual.

In less than a week the field was ready. Considering our bad luck with the three-engined machine, we decided to test the single-engined machine first. It had been christened the *Alaskan* and had dual controls.

With Eielson as pilot and myself beside him, we taxied out to the runway. In a few seconds we rose from the ground. The motor purred sweetly and we climbed steadily upwards.

© *Wide World Photos*

MAYOR F. L. DE LA VERGNE OF FAIRBANKS ADDRESSING CROWD AT CHRISTENING OF THE *Alaskan*

© Wide World Photos

"I LOST MY HEART TO THE *Alaskan*"

Everything was functioning splendidly. After we had reached a height of two thousand feet, and Eielson had fully tested the controls, he turned to me and said, "She is a mighty fine machine." I could see that also, and took over the controls for a few minutes to get the feel of the plane.

I have never, in my limited experience flown a machine so exquisite to handle. The smoothness of control, the power of the engine in the machine, making her start like a high-powered car when its throttle was opened wide in level flight, gave one the same sensation as if in a fighting plane. Yet in turns and glides she was steady, smooth, solid and stable. I lost my heart to the *Alaskan* on that first flight.

Eielson once more took the controls. It was my first flight with him, and I was glad to see that he was a cautious, steady, reasoning pilot,—just the type for the work in hand. I have flown with many pilots, and while I am not even a third-rate pilot myself, my experience is sufficient to enable me to understand something about the requirements.

I have found that pilots, broadly speaking, are of two classes. There are others of course, and there are exceptional men who are individual in their flying. But as a rule, a pilot will be either a slap dash, brilliant dare-devil whom Lady Luck has seen fit to favor in a miraculous way, or a steady discerning cool-minded man who flies steadily, meeting every condition with ready, though deliberate action. Eielson was a ready, deliberate, reasoning pilot.

We had been in the air about forty minutes, sufficiently long to get acquainted with the feel of the ship, so I asked Eielson to land. We had discussed the advisability of testing the air and flying low over the field when coming into a strange airdome; and had also talked many times of the difference between near-surface air layers over snow-covered ground as compared with those over sun-baked earth. It is well known by all pilots, who have flown over and landed on snow, that there is little if any ground pack—that is, there is not the little extra density or uplift near ground which is covered with snow that there is over earth which is warm from the influence of the sun's rays.

These things occurred to me as we circled and approached the field, but it did not occur to me to mention them to Eielson. He would surely be as conscious of them as I, if not more so. It was quite calm. We "lined" up on the field and approached with the engine throttled well back.

A mile or so from the field I felt the machine to be on the point of stalling, and was pleased, knowing by this that Eielson was getting the feel of the engine and machine controls; making a landing on the air in fact. He advanced the throttle, and we sped on, coming closer and closer to the end of the runway. I expected, of course, that he would fly along it close to the ground, then circle, and make a second approach before actually coming to rest. I was aghast when, just before reaching the end of the runway, Eielson almost closed the throttle and the machine immediately stalled.

We had less than two hundred feet altitude. There was no room to shove the nose down and pick up speed. Eielson, feeling the stall, did the only possible thing. He shoved the engine throttle open, but the engine had not time to pick up before we crashed to the ground about fifty feet from the end of the two-thousand feet runway. The runway at that end was bordered by a fence. As we crashed the under carriage doubled up and the machine shot forward on a keel that had been installed in case we should alight in the water and have to haul her out on the ice. Right through the fence we ploughed and slithered for about twenty yards. Eielson was as much astonished as I. "I had the throttle full open," he said, "but she did not have time to pick up."

Since the thing had been done, and as neither of us was injured in the slightest, or even unsettled from his seat, there was little for me to say. Eielson was a good pilot. I knew that, from his past experience and the way he handled the machine in the take-off and in the air. Every man is likely to make one or more mistakes, and there was no use crying over spilt milk.

We still had the other machine which we could use while this one was being repaired, so we climbed out and sought for the extent of the damage. It was comparatively slight, but of a nature that we had scarcely expected. The under carriage was wiped clean off, and badly smashed and twisted. The propeller was twisted and turned, each end in the shape of a ram's horn. We had brought with us all imaginable spares, supplies and tools for repairs. We could see that in time we could weld all the broken parts together and set the machine once more on its landing gear, but it would be a long job. It was too late to do anything that night, so we went back to the town.

Early next morning we jacked the machine up, fitted the travelling carriage and rolled it back to the hangar. We were fortunate anyway that the accident had happened on the runway and not in the deep snow far away or at a point from which it would have been hard to retrieve the machine. There was a great deal hinted in the remarks of our other pilots and the local men that day. "Well, you have still another machine and two good pilots," everyone said, "you can carry on with those."

The weather was fine and the *Detroiter* was ready. Local engineers were put to work repairing the smashed landing gear, so I thought it better to get right on with the job, and fly the *Detroiter* at once.

Whom should I choose as its pilot? I summed up the situation, and elected to have Major Lanphier fly it. Eielson, the hero of Alaska, had had his chance. If I had not been responsible to any one else, depending entirely on my own resources, I would have had Eielson fly the *Detroiter*. I had learned from my short trip with him that he was likely, as all men, to make mistakes, but not likely to make the same mistake twice. But if I had taken him on the second trial flight and something untoward had happened, I could scarcely have justified myself to the people in Detroit who had recommended the dashing, brilliant commander of the First Pursuit Squadron of the United States Air Force, —a man who held his position and the deepest respect of all the men beneath him because he could outfly and outmaneuver anyone on his staff.

There was Wisely, his Sergeant, used to flying big ships, but when Lanphier was there, I could hardly choose Wisely for this conspicuous job. The *Detroiter* was rolled out to the field, the three Wright Whirlwinds were started and warmed up. We shoved some cases of oil in the tail of the machine to make weight and get perfect balance, and I climbed in beside the Major.

The machine had only single control, so I could be but a passenger. "All clear" was signalled, and the engine's throttles opened. We quickly gathered speed, but to my consternation, we swung sharply towards the high snow bank on the left side of the runway. Unused to handling three throttle controls together, Lanphier had more than his hands full. To guide the machine with rudder only was quite impossible. I braced myself for a terrific crash—we must surely nose over if we hit the bank. Lanphier did the only sensible thing under the circumstances. He brought up the tail, shoved the throttles full open, and just before coming to the bank, bounced the ship off the ground.

We skimmed the top of the snow as we passed, and the three powerful engines swung the ship into the air. Up and up we climbed. It took us both a few seconds to regain our normal breathing. In the air the ship behaved very awkwardly, due to the fact that one engine vibrated so badly it could not be run at even normal speeds, and it was necessary to run the machine with each engine turning at a different speed. I had some fear for our safety in landing, and heartily wished myself out of the machine. There was no choice but to sit tight and discuss the situation. We climbed to a sufficient altitude and Lanphier tried out the machine, banking and turning and making several stalls and landings in the air. He quickly got the hang of the machine, but we could not keep the vibrating engine going long enough for him to learn to handle her easily.

I asked him to be sure to fly several times along the field and feel the air near the ground. He agreed that this was a good thing to do. We turned toward the landing field and approached it with engines throttled down. There was scarcely any wind, and we came lower and lower. As we approached the end of the prepared field, we were dead in line. Then, exactly over the spot from which we had hauled the crippled *Alaskan* a few hours before, to my utter astonishment, Lanphier cut the two side engines, expecting the machine to glide on the power of the center one. But, suddenly, we dropped straight to the ground. It was a bad stall, from almost a hundred feet,—exactly the same mistake that Eielson had made.

We had considered the Fokker landing gear weak for the maximum load we hoped to carry. It was sufficiently strong for all ordinary purposes, but no landing gear ever made would have stood the crash of our three-ton machine as it fell to the frozen ground.

One side of the landing gear crumpled. Then the other gave way. We slithered along the ground for a few feet, slewed into the snow bank and started to turn turtle. Seated as we were between an eight hundred gallon gas tank and a six hundred pound engine, I was badly scared. We could see the frame of the engine crumpling and being forced back upon us. It was an uncanny feeling. The tail of the machine was rising rapidly, but it seemed a slow movement to us; we could sense and see every move. Up and up it went until the machine was almost vertical. Parts of the engine frame stuck through its fire-wall into our cockpit. In a fraction of a second the machine would fall on its back and we would probably be as flat as pancakes. But no! It quivered in the balance for a moment, then slowly settled back with its tail high in the air. Neither Lanphier nor myself was injured in the slightest. It was my second escape in twenty-four hours.

The Major turned to me and expressed his sorrow. Nothing could have been more sincere than his regrets.

"I fully intended to circle the field again," he explained, "but when we came this far we were in such a fine position for a landing that I thought I had better come down."

Both men had probably been confused by the fact that the runway was only one hundred and twenty feet wide with a bank of snow on each side. The hazard was in the mental condition, not the physical one, for never once afterward, when the field was wider, did they swerve from a straight course after landing. They were always able to keep well within a space of less than fifty feet.

Well, we climbed out of the cockpit to examine the damage. The landing gear was almost a complete write-off, as was the central engine mount. We could manage to fix up the *Alaskan* with the spare material we had brought with us, but it would take weeks and weeks to get the material and repair the *Detroiter.* Perhaps no one in the world,—and the world was interested at that time because it appeared to outsiders as if there was a race between Amundsen, Byrd and myself to get to the Pole,—except myself realized what those two crashes meant to the Expedition plans and to me in particular.

Failure was plainly evident. A comparative stranger in Detroit, but with the support of Detroit men who had perhaps more confidence in my friends, Bowman of the American Geographical Society and Vilhjalmur Stefansson the explorer, than in me, I had accepted the help of over eighty thousand people and these people looked to me to succeed and justify their confidence. I could hardly be blamed for the crashes, yet, I would have to bear it. Stefansson and Bowman would have to bear censure for having recommended such a man as me.

With two wrecked machines, requiring several weeks for repairs, it was utterly impossible that we could complete our program that year or even really begin it. By the time the first machine would be again fit to take the air, the season for work over the Arctic Sea would be past.

But before we could do much work, we must carry our gasoline to Barrow. I had figured that two, perhaps three return trips with both machines would lay down enough gas to enable us to proceed with the three-engined machine; and while that machine was flying out to the east and west of Barrow, the other machine would carry enough gas from Fairbanks to allow us to undertake the trip to Spitsbergen. This was now out of the question. We would after three weeks have one machine,—the smaller, and weakened by a crash and hurried amateurish repairs,—to ferry gas to our base.

The other machine would not be ready for nearly six weeks, too late to be of service even if the repairs which might be done at Fairbanks were satisfactory. There was nothing to do but go on, keep faith and smile to the world while our hearts ached piteously within.

Messages of cheer and condolence came from all quarters, especially from a few staunch friends in Detroit and the American Geographical Society. They were willing, they said, to back me to the last, but urged and almost insisted that I should get new pilots. Then it was time for me to take things in my own hands. I would not think of changing the men and believed they knew it, so I smiled when I read them the telegram ordering their dismissal, but made no comment.

We set to work to repair the machines. In a few days I noticed that there was a feeling of suspicion in the air and a slight lack of interest in the work. I could not quite understand it until one day one of the men asked me when the new pilots would arrive. This, I think, hurt me more than the shock of either crash. How could they have believed that, because of one mistake which they were not likely to make again, I would dismiss them and, without saying so, wire for new men who should come to us while the old staff made the required repairs? I was compelled to tell them individually and collectively that, since I had agreed to accept their help I expected from them the heartiest cooperation and was willing to give them mine to the end. We had planned a job which we had said could be done, and we must do it. They turned to work with a will, but unfortunately the will did not last.

Time went on, weather conditions became bad for flying. Then, and only then, the necessity of taking advantage of the clear weather in late winter or in the early spring became clear to everyone. The task to them now seemed hopeless, and truly it was, but we could not afford to sit and weep.

After three weeks the *Alaskan* was ready. We would take no avoidable risks, nor could we spare the time for trials and the tests we had planned. We should load the *Alaskan*, and with Eielson as the pilot, take off and fly to Barrow, endeavoring to do something before there was a chance of another accident. There were no weather reports available from Barrow. The Snow Motor and Dog-Team Section[1] had assured us that they would establish a wireless base at Barrow long before we would be able to start. Although we had been delayed for three weeks they were then only less than half way through the mountains.

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[1] Attached to the Expedition was what became known as the Snow Motor Section. I had been interested in the possibility, as a means of advertisement for the Snow Motors, of two or three of them travelling overland to Point Barrow, carrying for us a wireless apparatus and what supplies they could. But the very nature of that plan demanded that we should consider the Airplane Section an independent part. When I learned that the expense in connection with the Snow Motors was to be shouldered onto the Expedition funds, I tried to veto their use, but was out-voted. It was at first expected that the Snow Motor Company should bear the expense except for the

However, I knew that Arctic Alaskan Coast by heart and believed if we struck bad weather and could not find the village of Barrow, we could land and wait for the weather to clear.

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salary of a guide experienced in travel over the Alaskan snows. The men of the Snow Motor Section eventually arrived at Point Barrow, but not with their Snow Motors nor with the wireless apparatus. About their activities I have little to say. In this volume I will deal mainly with the activities of the Airplane Section.

CHAPTER IV

WINGS OF WOOD

WE could afford no further delay and on March thirty-first, with a load of about three thousand pounds in the machine, Eielson climbed in and took the controls. I seated myself beside him and we took off. The *Alaskan* flew almost, but not quite as well as before. We had a load much heavier than had ever been carried in a plane of that size with a Liberty engine. Since the crash, we had installed the new engine which, while a beautiful piece of workmanship specially selected at the Ford Factory and presented to us by Henry Ford, was not as well tuned-up as the one first on the machine. The engine originally used had been built by Johnson of New York especially for racing purposes, and Johnson himself had assured me there was not a better Liberty engine in the United States. I believe he was right.

Neither was the second propeller as efficient.

We had at first used a perfect Curtis Reed twisted metal propeller, but after the crash, we had to use an old club propeller that had been thrown in with our equipment as an afterthought. A new wooden propeller ordered from Hamiltons had not arrived. But the *Alaskan* still handled well. We climbed steadily and steadily upwards, knowing we would have to reach five thousand feet to cross the first range of hills with safety. We thought that an altitude of six thousand feet would see us through because the peaks of the Endicott Range barring our course were shown on the very latest maps procurable as five thousand feet. We had secured these maps with the assistance of the United States Geological Survey. It was our intention to follow the general trend of the John River and cross the Anuktovik Pass.

Fifty miles from Fairbanks we came to a low fog which covered the Yukon Valley for a hundred and fifty miles. We could get no idea of groundspeed and drift. Through a break in the clouds we caught a glimpse of the Yukon. We had been out less than an hour, which meant that we were travelling over the ground at considerably more than a hundred miles an hour.

As we approached the Endicott Range the fog lifted and we could get a clear view of the ground. Ahead, high peaks loomed but our altimeter showed that if the maps we had were correct, we should be above the mountain peaks when we came to them, so Eielson did not bother to climb very high.

We watched the interesting panorama of hills and dales and the courses of the rivers and their many tributaries. In no other place, I believe, is there a river more crooked than those of Northern Alaska unless it be the Jordan of Palestine.

Soon we could see that the mountain peaks ahead were above our altitude. Our vision was not clear because the glycerine from the boiling radiator was blowing back on our windshields and fouling them. The sides of the cockpit were open. We looked around and saw that surely enough we were approaching at great speed the mountains that towered above us. An observation for ground speed gave a hundred and forty miles an hour. There must be a mistake somewhere! The air speed indicated ninety-five to a hundred, which was more like it. I thought my calculations must be wrong, but another check gave the same results. How under the sun were we managing to make this terrific speed?

The wind was directly behind. I hoped it would be so only as far as the mountains, for a south wind, such as we were experiencing, would mean fog and snow on the Arctic slope.

Eielson nosed the machine upward. She climbed fairly well, but at nine thousand feet she seemed to have reached her ceiling with the load she carried. We were amazed at first at the height of the mountains,—five thousand feet on the chart, and here we were at nine thousand feet and the mountain tops still higher than we were. We wondered if our compass and altimeter were wrong,—if we had swung clear off our course and headed into Canada where the mountains might be higher. But no, the sun's position showed that we must be more or less on our course and our compass, one of the latest English, Aperiodic design, was almost sure to be correct. We could only follow the compass course and hope for the best. The distance between Fairbanks and the mountains we thought must be wrong because we had arrived in such short time. Each of my observations for drift showed speeds of one hundred and thirty—one hundred and forty miles an hour over the ground, supposing our height above the ground was correct. But we had proved by our altimeter that the heights of the mountains as marked on the chart were wrong, so it was not unlikely that my observations for ground speed were much in error.

Although we were not above the mountain peaks, we could see between them, and by carefully threading our way, we managed to pass to a broad white plain on the other side. At this point our map was a blank. On it nothing appeared between the mountains and the coast. That would have been all very well, had we had time to have crossed the mountains, but the elapsed time since leaving Fairbanks was so short that I felt surely there was something wrong. The dull grey, unbroken density that appeared ahead must be a wall of cloud reaching high in the sky and hiding the rest of the mountains.

We sped on. In a few minutes we could see that the dull greyness ahead of us was really cloud, soft, floating masses with hazy-topped edges giving no straight horizon above them. The light grey clouds with sunlit tops blended perfectly with the sky. Beneath us, the land was covered. It was a weird and uncanny sight. We seemed to be the only speck in a boundless world. There was nothing for contrast and from which to judge space or distance; nothing in front of our eyes except the tapering bonnet of our engine; nothing below us to be seen but the same grey, grey mass. I am sure that we could find no situation more weird if we were to travel through space to the moon. The monotony and uncertainty of it would drive any man crazy if endured for long.

Our only consolation was that the sun shone dimly, about on a level with our wing. Eerie shadows were cast on our wind shield and these enabled us to note that our compass course was being faithfully followed. On the opposite side to the sun there shortly appeared two complete rainbow circles and in the center a ghost-like shadow of our plane. It seemed to me that it mocked us as we speeded on. The very shape of the shadow gave it a sinister appearance. I have seldom, in a variety of experiences, been so awed.

We might have turned back and would have even welcomed the jagged-edged mountains, but something urged us to keep on and on and on. It felt as if a great vacuum were engulfing us, and that we were doomed forever to fly into an endless grey mist as punishment for having dared to venture over the Arctic wastes on wings of fragile wood.

In less than two hours by our watch—it might have been two weeks or two years by our senses

—we suddenly came to the end of the cloud. To our right my attention was drawn to unmistakable water-sky, sky which I knew from experience would only be seen over open water. I looked down. We had been flying at four thousand feet, and there beneath was what appeared to be flat ice, dotted with small cakes of rubble and snow drifts. I had never seen the Arctic pack-ice from an altitude, but I knew that the ordinary rough pack would present a very different appearance.

Frankly, I was not sure where we were. I could see Eielson looking down and turning to me for some volunteered information. I nodded wisely and pointed to the course. "Keep going," I said. "We should take at least five hours to get to Barrow and we have been in the air not much more than four. We can't be there yet."

In a few minutes, the ice beneath us became rougher and rougher. It was the ice on the Arctic Sea. I could tell that by the way the ice piled up in ridges like huge swaths of hay. Then I realized that the water-sky I had seen a few miles back must have been the sky over the water near Point Barrow Village. Throughout the year, the winds, the tides and the currents keep gaping a lead of open water opposite Barrow, the width depending on the strength of the natural forces. We must have kept our course and passed over the tundra and lagoons without having seen them. But our time of flight had been amazing. Far ahead in the distance we could see more water-sky looming up. I was pleased to pretend that that water-sky was the particular sky I was looking for at Barrow and told Eielson so because I sensed that he was getting anxious.

"We must be over ice," he said, "that is surely ice beneath us."

"It is a job to tell from up here," I answered, "there are many smooth patches that might be lagoons on the tundra."

In any event, I thought, those smooth places will make good landing fields in case of trouble with the engine. We kept steadily on for an hour. As time passed, I recognized the familiar characteristics of the Arctic pack. It was more than an hour since we had first seen the ice and we must be about a hundred miles from shore. So far as we knew, no man had been so far in that direction. I was jubilant. We had actually started our work of exploration! Quite unwittingly at first, but now we were on the way, it was our chance to make a little headway.

I leaned over to Eielson and suggested, "If you look ahead you will see a hundred miles further north than any man has seen until today. We are a hundred miles out over the Arctic Sea. What do you say to going a half an hour longer—just to make it good measure?"

I could see he was not anxious to go or quite positive that I knew where we were. And to be sure, I was not, but I was certain that we were over *new* territory, and the joy that this feeling gave me must have influenced Eielson.

"Whatever you think best," he consented.

So we kept on for a half hour more. We were using the precious gas that I intended for a longer flight, but I was glad to have had this opportunity of at least doing something before we made any attempt at a landing. When we came back even if we could not find Barrow hidden under the clouds, as it appeared to be, we could land somewhere back near the edge of the clouds and await fine weather.

I could now get an idea of the rate of speed at which we were travelling, because the ice gave me a good opportunity to take a correct observation for ground speed, thus proving that our ground speed and air speed over that area at least were equal. It was about one hundred miles an hour. As we were at least a hundred and fifty miles from shore, I asked Eielson to turn back and reverse the course, and since there was apparently no wind where we were, we should strike the cloud-edge at the point where we left it. We chogged steadily back, the engine now throttled down a little in order to save gas and reduce the possibility of trouble.

On and on we went. It took us two hours to reach the clouds, and before coming to them we noticed that the ice was obscured. It must be that we had again come within the influence of the wind and the surface was covered with drifting snow. I motioned Eielson to lose height—we had been flying at four thousand feet, and we came down to two thousand feet. Then I could see what the trouble was. There was a howling blizzard on the land. It looked as if there were no chance of finding Barrow Village in a storm like that, but we'd have to try.

We climbed again to four thousand feet to clear the clouds. It was now a case of figuring and dead reckoning. We were undoubtedly lost, in the sense that we did not know where we were. There was nothing to identify. The wind and drift covered the land. It was clear and calm out to sea. We must first turn to the east and make sure that we were still east of Point

Barrow and over the land. Having satisfied ourselves on that point, we decided to fly inland for fifty miles and then, turning due west, come down as low in the clouds as possible. By keeping a sight of a hazy sun we could check our direction. We hoped by flying as low as possible to see the coast which to the southwest of Barrow is steep.

When we had travelled a half hour south we turned west and after a few minutes, Eielson shouted, "What's that over there on the left? Looks like houses."

I looked and saw something like houses or snow-covered buildings of some kind. Then I carefully looked with binoculars in the direction Eielson was pointing. I could see nothing where he thought he saw houses, and he could see nothing where I thought I saw houses. We were beginning to get over-anxious and our minds, as do the minds of men weary and wandering, began to conjure up all sorts of visions.

I found that I could see houses and villages almost everywhere. If I had followed my inclination and every impulse at that moment, we would soon have been flying in circles. The only thing to do in such a case, as I had learned in early youth, was to concentrate on some particular thing. Do one thing at a time and make sure of it, depending on some solid fact.

The Aperiodic compass was our standby. We must stick to our compass course and dead reckoning, no matter how far off it should take us. At each move and turn I had noted the extent of our turn and line of flight on the map, and according to that we should be close to Barrow, within fifteen miles at least, but finding it seemed hopeless. It was quite possible that the clouds extended well over the ocean to the westward, and we might discover ourselves on the way to Siberia before we came to clear weather.

I was on the point of turning north to land on the first smooth ice we came to, when, right beneath us I caught a glimpse of a low, cliff-walled coast. It was a fleeting glimpse, but I jerked Eielson's arm, pointed down, and brought him round at right angles to our course. We had gone out to sea a couple of miles before we could turn, and as we fought our way back against the wind, I began to fear that I had been seeing things again. But I hadn't. At last there was a faint outline of a cut-bank trending north. Hooray! We had only to follow the coast and we would soon reach Barrow. Eielson was not so confident. It was his first sight of the Arctic

Coast, and its appearance that day was not at all inviting.

He swung the ship down low to the ground and closely followed the coast line. The air was turbulent near the ground. The snow could be seen drifting and pouring over the tops of the cliffs like sugar out of a barrel. It was an old, familiar sight to me, but new from the altitude of an airplane in flight. Hitherto I had struggled afoot in the drift. I had shrunk from the feel of cold chilling snow thawing and freezing again as it stuck to the face, and gripping the flesh in rigorous frost-bite. Compared to those experiences, our position in the airplane was comfortable.

Soon we came to a little lagoon that I recognized as one near Point Barrow. I shouted, "Only fifteen miles to go." Eielson kept steadily on, but I'm sure he was skeptical. The wind was strong and our course broadside to it. We crabbed along the beach with our nose almost directly across it. It seemed an eternity to me. Would we never come to the village? Had I been mistaken? No, that could not be. To those familiar with that part of the Arctic Coast, the cut-banks were too sure a sign. In a few minutes, our anxiety was over. Dimly appearing through the snow, we saw a low Eskimo house, then a spire and church and a two-story building.

Almost as we realized what they were we had passed them. Swiftly, we flew over a half a mile of lagoon, then some more houses. I recognized the Cape Smyth Whaling and Trading Station, where Charlie Brower had so hospitably treated us in 1913, when the Stefansson five of us had arrived with little food and few clothes. There was no need to fire a smoke bomb to tell the direction of the wind. From a low altitude, the drifting snow looked like huge writhing snakes squirming across the lagoon. I drew a hurried sketch for Eielson, showing him where to land, then went to the back end of the cabin and piled all the loose gear in the tail of the machine. We were at Barrow, and we were about to try an experiment that many had claimed would end in disaster.

"It will be impossible to land on the Arctic snow with a machine fitted with wheels," they had prophesied, "even if the snow crust is hard. It will break, act as a block, and the machine will turn turtle."

I felt reasonably sure it would not, but a load in the tail might help. We swept low over the ice, just cleared the sandpit, touched the snow as lightly as if touching a cloud, and quickly, but smoothly, came to rest. We taxied to the foot of a bank near the Eskimo houses which surround the trading post.

It wasn't until I opened the door of the machine that I realized what sort of a day it was. It was weather in which no man would think of travelling afoot unless bound to do so. There was a high wind, drifting snow and a temperature of forty below zero. As I climbed out of the machine, not many people were to be seen. A few boys came running helter-skelter for us, but most of the older people were in their homes, sheltering from the storm. However, a crowd was not long gathering and among them I recognized old friends. One Eskimo, named Pauyurak, a fat, lazy, but likable, old beggar, who had travelled with us on my first sled trip in the Arctic, was almost the first to greet me.

There were also some other Eskimos I had seen during my stay at Point Barrow thirteen years before. Then came Charlie Brower and Fred Hopson, puffing and blowing with excitement. Obviously they were most happy to see us and they little knew how tremendously happy we were to see them. But beside the machine was no place for gossip. Cheeks and noses froze solid in the biting wind. Fingers were nipped. More and more people appeared. With the last arrivals came two handsome young ladies and a portly short person who, when introduced, proved to be Dr. Newhall, physician in charge of the Presbyterian Mission.

We slung the canvas cover over the engine. Fortunately the cabin of our machine was snow-tight, so we could leave our load inside without fear of damage. We gathered up a few odd things and struggled up the bank to the trading post. Once inside, we had time to look about us and be introduced to the strangers. The two young ladies were Miss Bannon, nurse in charge of the hospital, and Miss Edna Claire Wallace, a writer of fiction and adventure who was at Barrow collecting notes for a book about Arctic life.

Fred Hopson wasted no time getting a cup of steaming coffee for us. We enjoyed it thoroughly and listened to the news of the Coast.

CHAPTER V

NORTHERN HOSPITALITY

I HAD sent a wire to Barrow in November, promising to reach that place by airplane some time about the middle of March. It was now almost the first of April, and they had just about given us up. Their interest had been maintained, however, by the fact that Mr. Earl Hammond, of Nome, had by mutual agreement with my old travelling companion, Aarnout Castel, offered to bring some Arctic equipment from Nome to Barrow by dog team. Hammond had arrived after a splendid trip on the fifteenth of March, and with the confidence of the uninformed, had assured them that I would be there soon. They had almost reached the point of openly doubting his word, when we arrived.

The day of our arrival was one of the worst that season. It was weather in which no one had dreamed we could possibly fly. We certainly would have preferred to have dreamed rather than experienced the conditions we went through, but once inside the trading post, where an air of hospitality and good cheer was evident, we easily forgot the anxiety felt during our flight. Fred Hopson's constant chaff and Miss Wallace's almost insolent wit kept us amused. We were glad to have made our first real Arctic flight. From the native village people came hurrying to see us in spite of the storm.

One of their number had seen a ghostly thing sweep out of the sky and disappear over the Arctic Sea. He had not been sure if it were an actuality or a vision and had gone the round of his traps still wondering, when behold the thing mysteriously appeared again, flashed through the overhead drift of cloud and disappeared into the South. He had heard the throbbing of an engine, but could not see it because the thing moved so fast. Could it be that the big flying machine which he had heard spoken of at the trading post had arrived? He had hurried down to see. Sure enough, it was there fastened to the lagoon. He came into the trading post and told his story.

He had thought it must have been us that he had seen, but having looked at the actual airplane on the ground he was not so sure, for how could such a great heavy thing fly through the air? It might very well drop from the skies, but how could it pick up people and carry them from the ground? We were there, he could see that, and supposed it must be the fortune of the white men now to travel that way. But in his early days it was only the *angatkoks* (the old medicine men) who were able to fly through the skies. At all events he said, shaking his head, now that thing was there, on the lagoon, it was down to stay, for no such big thing could ever rise like a bird, he was sure of that.

This man's story gave me the very information I wanted. The fact that he had seen us go out over the ice and return three or four hours later—he was not sure of the time—gave us the exact position at which we struck the coast and also where we came to it on our return. It showed that we had missed Point Barrow in the driving cloud and snow by less than seven miles after a flight of five hundred and fifty—much of the way over cloud covered surface.

Our course back over the ice had been correctly followed. We had passed back within two miles of the place where we left the shore and after an out and back flight to a point at least a hundred and fifty miles from shore. Not being able to see Point Barrow, we had flown inland and only by turning to the west, keeping low down in the clouds and following the coast line when we struck it, had we been able to reach our objective.

This evidence pleased me more than enough, for we had by sheer necessity to navigate by compass and dead reckoning on that trip. Having done so proved beyond doubt that we could depend on our compass in the neighbourhood of Point Barrow at least.

That evening we fixed the hand gear to the radio set which had been built by Malcolm Hansen of Washington, D. C., and sent out a message saying that we had arrived safe and sound. For five days we were held at Barrow by the snow storm. Until that day the weather had been fine. Throughout the whole of March the snow had been scarcely eight inches deep on the lagoon where we landed.

Later in the season I expected to meet storms and deep snow and intended to overcome the difficulty by cutting in the snow two tracks or gutters just the width of the tires. A third gutter would be cut for the tail-skid. If required, it would be a feasible job to remove the snow entirely from a track twenty or thirty feet wide, but to do so would entail not only a great deal of labor, but raise banks of snow beside the runway. If the machine swung slightly out of control, these snow banks would bring about disaster. They would also cause high drifts to form filling the runway and before each take-off the same amount of work would have to be done. Cutting gutters to just fit the wheels and tail-skid would, if the snow were deep enough, reduce the chance of the machine turning or swerving from the runway in the take-off.

However, I was curious to know if the machines could get off the Arctic snow without preparation. We had filled the radiator of the Liberty engine with a mixture of eighty percent water, fifteen percent alcohol and five percent glycerine, so we had no occasion to empty the radiator before a starting even at the lowest temperatures experienced. We found it necessary to drain the oil from the tank after each flight and warm it before setting out on the next journey.

A special canvas cover for the engine was provided, but at Barrow, we hung over the engine a tent, the walls of which came down to the snow.

Inside the tent we placed an ordinary kitchen stove. An Eskimo watchman was appointed to keep the stove going slowly in order to keep the engine well above freezing point. I doubt if we needed to take that precaution because the engine at Fairbanks had been subjected to much lower temperatures than those we would experience at Point Barrow. The lowest temperature we experienced was 52 below zero Fahrenheit. The engine showed no ill effects from this exposure and when warmed by hot oil started without difficulty. But at Point Barrow, in order to be ready to start back at any moment, I planned to keep the engine always above freezing point.

After five days' delay, the weather cleared and we were ready to start on the return journey to Fairbanks. The engine had been provided with a hand crank for starting, but this had stripped its gearing at Fairbanks. It was necessary for us to swing the propeller. The engine started at once and we tried to taxi through the soft snow. At high speeds the machine would taxi well, but would not move slowly without the help of several men pushing on the landing gear.

At first it seemed as if we would get off without difficulty, but in the center of the lagoon the snow had softened, the wheels sunk in the snow and it took quite a long run before the machine began to lift. Then the wheels would strike the tops of the drifts reducing the speed and we would be forced down to earth again. With the machine almost empty we could have taken off but we had to carry enough gas for a return trip of more than seven hundred miles in calm air. The course we flew was almost six hundred miles, and some reserve must be provided for head-winds, etc. We also had on that first trip many odds and ends as well as mail from the people at Point Barrow to their friends at Fairbanks. After three attempts we barely managed to get off, and set out for Fairbanks.

The coast and the country for two hundred miles inland was covered with clouds four thousand feet high but after going one hundred miles we could see the high Endicott Range one hundred miles or more ahead of us. The two hundred miles of flight before coming to the mountains gave us an opportunity to reach a safe altitude and at eleven thousand feet we flew over the highest peaks. For the first hundred miles after coming to the mountains I carefully checked the drift and ground speed and sketched many geographical features not shown on the latest

Government maps. As we descended on the Yukon side of the Endicott range I again checked the drift and set the course for Fairbanks. Thinking that once over the mountains the wind direction would hold—and in any case Eielson, who had been flying for five years about Alaska, would surely recognize the country and fly direct to Fairbanks—I went back into the cabin to straighten out our things.

I noticed as we crossed the Yukon that there were heavy clouds ahead. I checked our position by the geographical features marked on the map, then settled back feeling sure that the pilot would find his way. When an hour had passed, I noticed that Eielson was turning the ship from side to side as if trying to recognize the country, but the conditions thereabouts in the few days we had been away had changed entirely. Much snow had disappeared from the surface. The general appearance of the hills and ranges was very much altered. The small creeks and rivers were now running water and the areas we knew by heart before we could not recognize.

I asked Eielson if he knew where he was or the direction of Fairbanks. He didn't recognize the place. He thought that I was keeping careful check so he had not troubled to observe the country. We should have been near Fairbanks so we began to circle, climbing higher and higher, expecting to see the town every moment. I took an observation for drift and ground speed, and found that we were being carried quickly to the northeast. It was an hour since I had taken the previous observation and there was now no telling where we were.

Far in the distance we could see the Yukon River, so I decided to fly back and notate some exact position and then make a new departure for Fairbanks. It was due entirely to my neglect that we were in this predicament.

To reach the nearest point on the river we travelled northeast and the first place that we could recognize was the town of Circle. Eielson knew the town because high wireless masts had been erected there. He knew there was a trail leading from Circle to Fairbanks which he thought we could follow, but we could now see that there was a storm over Fairbanks and the wind was against us. We were anxious to get back as soon as possible and let our friends know that we were safe. As we nosed down to fly over the trail the oil pressure gave out and the engine began to miss. We realized we would have to make a landing at Circle and replenish our fuel supply. We could land on the river just in front of the town, get some gas and oil, a weather report from Fairbanks and then, if advisable, return that evening. We flew once or twice along the river looking for a suitable landing place. The ice in some parts was unsafe, in other parts it was covered with water. A mile distant and opposite the town was a river bar covered with snow and although we thought the snow would be deep it seemed to be the best place to land. Eielson made a perfect landing, the machine coming smoothly to rest on the snow.

The people of the town came running over the ice to greet us. Among them were men and women and Indians, who had never before set eyes on a plane. Naturally they were curious and an incident happened that day significant of the great spirit found in the far north countries.

A young married white woman who had never before seen a plane had run half a mile across the ice in order to see the curiosity before the thought came to her that whoever might be in the plane would be hungry. Putting aside her personal interest in the machine she ran the half mile back to her house, snatched from the stove the dinner she was cooking for her husband and herself, placed it in one can and put that can in another can full of hot water, then hurried back over the ice to the plane and offered us her hot meal before gratifying her curiosity. It has been my good fortune to receive kindly treatment from strangers in many lands, but I believe the thoughtfulness and energy displayed by that lady of Circle City outshines all other demonstrations of hospitality I have seen.

Within an hour we had our meal, poured some gas and oil in the machine and were ready to set out, but at that moment came a message saying that the weather was extremely bad at Fairbanks and advising us not to return that night. So we covered the engine, borrowed a couple of oil stoves to keep it warm and with everything safely housed we climbed into the cabin of the machine and went to sleep. Early next morning we started to clear tracks in the snow for the wheels of the plane, as we had intended to do at Point Barrow. In less than two hours we had a runway sufficiently long, and starting the engine, fortunately without trouble, taxied along the tracks we had made, turned the machine about and took off without difficulty. In an hour and a half we were at Fairbanks.

Our friends had heard our wireless signals from Barrow and knew we had reached there safely. Those signals were, I believe, the first messages ever sent and received by wireless from Point Barrow. Many wireless operators from boats had tried, while lying at Point Barrow, to send messages outside, but none had succeeded. It was believed that about Barrow there was a wireless dead spot. I had little confidence in the existence of so called dead spots anywhere, and our messages proved that there was no such thing about Point Barrow. There was some difficulty, however, and the published description of our meager message shows the ability of our newspaper men to make a story.

When on the ground we turned our wireless generator by hand, using a highly geared mechanism. Even with the gearing it was as much as a man could do to turn the handle for a few seconds at a time, so I lined up Eielson and three Eskimo, one behind the other, and arranged for one after the other to turn the handle for a few seconds. Taking turn and turn about in this way I could dot and dash out a few letters at a time, but of course could not send a connected message. The newspaper reporter wrote that our wireless instrument was working perfectly, but said that we had neglected to learn the code and had to stop every few minutes to look up the letters. This man, of course, knew the difficulty of turning the wireless generator, but the other was a far better story.

CHAPTER VI

NICKING THE MOUNTAIN TOPS

WE received a great ovation upon our return to Fairbanks. We had, even against the odds, carried out the longest non-stop flight so far made in the Arctic. We had covered a distance of nearly a thousand miles and had actually looked over an unknown area in the Arctic one hundred miles farther north of Point Barrow than any other man had been.

The repairs to the *Detroiter* were being made as quickly as possible, but it would be some time before she was ready for flight. There was much freighting of gasoline to be done and if it was to be done with a single engined machine crossing the high Endicott mountains, there was no time to lose. We were held up for a day on account of bad weather, but the day after we made the second trip to Barrow. On that trip, as before, we followed a course over Livengood towards

Wiseman, then swinging westward, crossed Koyukuk, followed the John River over the Anuktovik Pass and then crossed the two hundred mile stretch of tundra to Barrow.

As before, we did not see the ground after crossing the Endicott Range until nearing Barrow. It proved that this overcast condition was to be found throughout the latter part of winter and early spring. The Endicott Range was clear, but fog four thousand feet thick covered the tundra, leaving only the extreme point at Point Barrow and the sea-ice clear. On the second trip we trusted our compass course and came to the coast within a few miles of Point Barrow and soon landed on the lagoon.

The Eskimo were more impressed with this second trip than they were when we landed first. Some of them said: "We thought at first that your coming here in a flying machine was wonderful. It was such a thing that medicine men in olden times might do, but when you left we began to wonder if we had not been dreaming. Now you are here again, we know that airplanes are a fact."

We landed the second time with enough gasoline to return and two hundred gallons to spare. One more trip and we would have sufficient gas for a long trip over the Arctic Ocean. In less than ten hours after landing at Barrow, we were on our way back to Fairbanks. Part of that time had been occupied in cutting gutters in the snow for I had decided that it was safer and quicker to cut the runways than to bump our machine over the irregular snowdrifts.

We had taxied the machine to the runway and were almost ready to start when my mitten caught in the spokes of the wheel and my right arm was dragged between the wheel and an upright stanchion supporting it. I felt a terrible pain and a snap in my wrist, but for the moment thought it was only a sprain, so I climbed into the machine, gave Eielson the signals to start and off we went. It was my custom to dress lightly while preparing for a take-off, and to put on dry, warm clothes in the cabin after we had climbed into the air. But this day, that was impossible, because I found just a few minutes after we left the ground I could not use my right arm. It was really a serious position. If all went well and we landed at Fairbanks, it would lead to no trouble. I could get my arm attended to there. But in the case of a forced landing, we would be practically helpless. Eielson was not an experienced hunter, I could not change my clothes, nor hold a rifle. We had only a little food in the plane. With only one arm I was unable to use the drift indicator, so I kept as close a check on the ground position as possible and maintained a compass course.

The roar of the engine prevented Eielson from hearing me speak and to write instructions to him lefthanded on loose sheets of paper in an unsteady airplane was not an easy matter. Naturally my notes were short and none too clear. Eielson had difficulty in reading them. He no doubt wondered why, but I did not tell him about my arm.

We intended on that trip to follow the river valleys as far as possible, for should the plane come down we might then get some assistance. The wind drifted us a little to the west so after passing the Endicott Range we followed a river which was obviously that one marked on the map as the Alatna. But when we came to the junction of this river and the Koyukuk I saw that the village marked on the map on the northern side of the river was not there. However about a mile on the other side could be seen a village on the southern banks of the Koyukuk. I asked Eielson to fly up the river and see if that village could be identified on the map.

We passed up the river, crossing contours that showed clearly that if the rivers were correctly charted, we were where we thought we were. But neither of the villages indicated beside the rivers could be found. There were only the few houses in a position where no village was marked on the map. Knowing that we had scarcely sufficient gas to take us back to Fairbanks I did not care to leave the habitation we saw until I knew its exact position.

A landing might have been made on the river nearby, but rather than invite delay and possible trouble, I asked Eielson to fly low over the houses while I dropped a note asking the inhabitants to spell the name of the village in the snow. With my left hand I hastily wrote the request on a piece of paper, and dropped it at the feet of the people as we flew past. Remarkably comprehensive, they soon set about stamping large letters in the snow, but the letters spelled the name of a town not mentioned on my maps. This was even more confusing.

I could have sworn that my interpretation of the map was correct and that we were where I believed we were, but anxious to reach Fairbanks without mishap I still did not wish to leave until I could definitely fix our position. We circled again and I dropped a second note asking the people to please stamp out an arrow pointing in the direction of Fairbanks. The people without hesitation or without troubling to stamp the snow formed themselves in the shape of an arrow, pointing in a direction which confirmed my belief that we were at the junction of the Alatna and the Koyukuk.

With this confirmation we could proceed and in an hour reached the Fairbanks airdrome. As soon as we were in sight of the town Eielson shut off the engine and we glided to the field. We had less than a gallon of gas in the tanks when we stopped at the hangar. It had been a narrow escape.

Many people had hurried to the field and were anxious as usual to greet us. It took some maneuvering to avoid the many outstretched hands while explaining that my wrist had been slightly strained. I left the field as soon as possible and in my room at the hotel had the first opportunity to discover to what extent my arm was injured. It seemed that the small bone of my forearm was broken in two places. But as I could not afford to let that delay us, I mentioned it to no one, bandaged it the best I could and carried on with the work.

Unsuitable weather held us at Fairbanks for two days and then we set out once more for Barrow. On our first flight we had carried a load of 3,500 pounds in the machine—which had been built to carry a ton. On the second trip we took 4,000 pounds and because we had managed to carry that load over the lower passes, we set out on a third trip carrying 4,750 pounds. This was crowding the load limit and it was not long before we realized we would have trouble in crossing the Endicott Range. High clouds hid the tops of the mountains, but not wanting to turn back or land with the heavy cargo aboard and be put to the inconvenience of taking off again, we decided to go ahead and risk getting through the clouds and over the mountains.

It was during those days of flying that I came to appreciate the sturdy courage and fine qualities of Eielson. He was always willing to take a reasonable chance, always recognized danger and with great care avoided as far as possible all trying circumstances. He was not a daredevil who would dash into anything. He summed up every situation and looked at it from all angles and then whenever there was a possible chance he went ahead.

On the day of our third flight conditions were bad as we approached the mountains. Dense fog filled the valleys and high clouds covered the tops of the range. There was no hope of passing over the clouds with our heavily loaded machine and to find a safe air-way between the mountain peaks was not simple. We pushed on hoping that we might by chance get into somewhat thinner clouds at the center of the mountain range. Shortly we were dodging back and forth with heavy clouds on every side. It looked as if we would have to dump a part of our load of gasoline in order to gain altitude but when I wrote Eielson a note to that effect, he said, "Let's try for five more minutes and see if we can't get through."

There were many cases of gasoline distributed on the floor and to give the machine every advantage for climbing I placed all these cases up near the pilot's cockpit. As I was doing this we came into a very bumpy area, the plane was tossed and turned so that I lost my balance and fell against the cabin wall, again fracturing my arm, which had just begun to grow together.

Just then I noticed on the left side of us a sharp mountain peak. It seemed as if we must smash into it. I hurriedly motioned to Eielson to keep to the right, but he indicated that there was a mountain peak on his side also. There was not time to turn, the only thing to do was to go straight ahead and hope that we could get over or pass between the piles of rock.

Even had we had sufficient height, it would have taken a calm, cool-nerved pilot to fly the machine through that narrow gateway. Eielson kept steadily on. Climbing the machine as much as possible, we passed through the gap with only a foot or so to spare between the wings of the machine and the walls of rock. As we went through this gap in the mountain top, I looked down and saw that the wheels were spinning fully as fast as if we had just left the ground on a take-off. I could not see where we had touched the snow, but I am certain the wheels had dragged through the snow ridge as we squeezed between those peaks.

It was a narrow shave, too narrow for comfort, and we welcomed the clearer atmosphere found on the other side of that range. Following down the valley we had entered we came out over the tundra north of the mountains.

The clouds above the tundra reached an altitude of four thousand feet. We flew close to the tops of the clouds, guided by the sun, and reached the coast about twenty miles east of

Barrow. I recognized the coastline and we were soon on the lagoon near the village. We had used a great deal of our gasoline in flying through the clouds and over the mountains, but still, if we could get back to Fairbanks and bring the new machine, we would have enough for at least one long flight.

Bad weather held us at Barrow for a couple of days. In one way I was thankful for this delay because it gave Charlie Brower an opportunity to dress my arm.

When we were again ready to start back for Fairbanks and tried to start the engine, we found it unresponsive. With one arm in a sling it was not easy to turn the propeller and it was necessary to warm the engine again.

While the engine was being warmed we went back to the kitchen for a cup of coffee. Just then an Eskimo came running in and shouted, "Your plane is burning." We bolted for the door, up and over the snowbanks, seeing in the distance a cloud of smoke and flame. Our hearts sank to the lowest depths. Judging by the volume of smoke the plane must already be reduced to embers. When we reached the top of the snowbank our spirits revived for the machine was still intact, and apparently undamaged. The canvas covering of the engine, however, was completely gone.

It appeared that the Eskimo watchman, impressed with the importance of heating the engine, had put too much seal blubber in the stove and some sparks from the stove pipe had fallen on the parafined canvas covering. The canvas caught fire instantly and in a few seconds was consumed in flame. The very fact that the light tent burned away before the plane could catch fire saved greater damage. The heat had been intense for the few moments it lasted. The paint and varnish on the propeller was scorched and blistered from the extreme heat it had been subjected to but on a close examination it appeared to be little impaired. We anticipated no trouble because of it, but in this we were wrong.

The engine was warm and started easily. The weather was rather threatening to the southward and soon we could see that we were in for grief. A fog up to four thousand feet spread out over the tundra and we flew above it. Above us was another layer of cloud, the bottom of which was about eleven thousand feet high. Between these cloud layers ascended columns from the lower cloud mass to the upper. It was the most peculiar cloud formation I have ever seen. So numerous were these cloud pillars that we were compelled to thread our way between them. The air was turbulent and the machine, usually quite steady, was tossed like a sheet of paper in a windstorm.

We went on for a hundred and fifty miles, flying in and out the clouds. There was no telling how high they might be, probably they were higher than we could rise, and with the mountains ahead, I thought it better to turn back to Barrow and wait for fine conditions. We swung about to find that the clouds had closed behind us. We tried to get above them and came near enough to the top to see the sun and take our departure for the coast.

We could see nothing of the ground beneath us, so we set a compass course which we expected would bring us well to the east of Point Barrow. If we were sure that we were to the eastward we could, when we were over the sea ice, come down almost to sea level and fly along the ground to Barrow.

On and on we went, keeping the machine just in the top of the clouds, and followed the compass course without much effort. When sufficient time had elapsed to have brought us to the coast we were still above the cloud mass. We continued northward until at last through a hole in the clouds we glimpsed some pack-ice. The parting in the clouds was too small to enable us to spiral down, in clear atmosphere, but Eielson skillfully brought the machine through the clouds to within fifty feet of the ground.

We could see probably not more than one hundred yards ahead, but the rough ice gave us some sort of an horizon. This enabled Eielson to keep the plane level and to travel in one constant direction. The general direction of snow drifts gave me an idea of the direction in which we were travelling, and we headed as nearly as we could for Point Barrow. Once away from the rough sea ice, the horizon was lost, and it was almost impossible to fly straight on. By keeping low over the ground, heading first out into the pack-ice and then back to the shore, we were eventually able to reach the lagoon near Barrow Village. An easy landing was effected, but we were disappointed that four hours gasoline had been used for no useful purpose.

On second thought, it could hardly be termed a useless flight. Our experience had proved that even in thick foggy weather we could if necessary find an horizon by flying low down over the rough Arctic pack. It was possible to keep as low as a hundred feet because we knew that there was no obstruction higher than that on any part of the Arctic pack-ice.

The weather held us up for two more days and then we tried again.

CHAPTER VII

THE GREATEST THRILL

WHETHER it was the heat from the fire or the general dryness of the atmosphere, or both, we do not know, but something had caused the propeller to dry out and warp. We had only gone a few miles on a second attempt to return when it started to come to pieces. The engine jumped and rattled and the propeller clattered. The machine shook so much that we thought it would fall apart. We were not quite certain what was wrong. Eielson shut off the engine at once and then we glided smoothly. By that we knew the trouble was in the propeller and banking steeply Eielson glided the machine to a small lagoon near the village.

I climbed out of the plane and found that both trailing edges of the propeller were loose. The glue holding the lamenations had become so dry that the propeller was disintegrating. We were lucky to have gotten down with no more damage.

The propeller seemed at first to be beyond repair, so we dragged the machine back to the stove near the trading post and sent a wireless message to Lanphier asking him to hurry the repairs on the three engined machine and to bring us a new propeller.

After two days we got most disquieting news from Lanphier. He had tested the machine and according to him it was useless for our purpose. He reported that the maximum speed was ninety miles an hour, fuel consumption fifty-two gallons an hour and that the machine would not carry sufficient gasoline for a trip to Barrow and back. He claimed that the center engine was out of alignment, that the controls were awkward and uncertain, and that even with the three engines at full speed the machine could scarcely climb to an altitude of five thousand feet.

I could scarcely credit these statements because it seemed unlikely that Anthony Fokker would have built a machine with such poor qualities. Lanphier's report stated that the Whirlwind engines would not function well in the cold condition, but we had already tested them in Fairbanks in very low temperatures and I believed that the trouble was not in the engines themselves.

The single engined Fokker machine with four hundred horse power could climb to nine thousand feet with a load of fuel sufficient to take it from Fairbanks to Barrow and back again, and carry besides a hundred gallons of gas to be left at Barrow. It seemed unreasonable that the new machine with six hundred horse power should have such a poor performance. Still Lanphier, the hired Fokker expert, Wisely, reserve pilot, and Andy Hufford the Wright mechanic had carried out the test and we had to accept their report. We had no alternative but to repair our broken propeller and try to return to Fairbanks.

It would soon be too late in the season to do very much, so we hurried the repairs as greatly as possible. It was not a rapid job, handicapped as I was with my right arm in a sling. We filed off the rough splintered edges of the propeller and bound it firmly with strips of brass.

The next day came word that they had again tried with the *Detroiter,* but meeting a head wind they had turned back fully convinced that the machine could not be flown to Barrow.

The following morning we started our engine and took off for Fairbanks, but no sooner were we in the air than we realized that it was impossible to go on. The propeller we had repaired proved to be so rough in the air that the machine shook and vibrated to such extent that we couldn't even keep our eyes open. Eielson stopped the engine, turned sharply and glided once more onto the lagoon. At each attempt we used more and more of our precious gasoline.

Again we removed the propeller, bound both sides of it with brass and carefully balanced it. The task took us three days and then we made another start. That time the propeller ran smoothly and we reached Fairbanks without incident.

At Fairbanks we got many reports about the behaviour of the *Detroiter*. Some said the machine was not capable of doing the job, but most people said that no real attempt had been made to take it over the mountains. However, as a new propeller for the single engined machine had arrived it was installed and rather than lose time making further tests I thought it better to return to Point Barrow with the single engined machine and carry on with it.

As soon as the engine was started we could tell from the sound that there was something wrong.

It turned many more revolutions than it should. We tried to taxi the machine, loaded as it was, but the new propeller gave no power and the machine refused to budge. We removed the load, thinking to test the machine empty and see if the propeller they had sent would be serviceable if once we had it in the air. We made two attempts to get off the ground, but each time we overran the runway and careered into the rough land beyond. Many willing hands helped us drag the machine back to the field and we decided to reinstall the old brass bound propeller and make it do. The load was replaced and we started down the runway. We had almost reached flying speed when in crossing a slight depression there came a bump and a crash. The right wing of the machine gave way and let us down to the ground! The machine slithered along on its fuselage and finally stopped with its tail sticking up in the air.

I had been standing in the doorway, leading to the pilot's cockpit. Eielson was at the control. Thirty loose cases of gasoline were on the floor of the cabin and as the machine crashed these cases piled on top of me and pinned me in the doorway. The gasoline from the wing tanks of the machine poured onto the hot exhaust pipe of the engine. "Hurry up and get out, she will surely catch fire," Eielson shouted, but anchored as I was beneath the gasoline cans I could not move and Eielson could not get out because I blocked the way.

Fortunately the machine didn't catch fire and after the cans of gasoline had been removed we crawled out and examined the damage. It seemed that the wing which had broken had been fractured for some considerable time. It had no doubt been strained again when we overran the field with the poor propeller. The main spars of the wing had snapped off abruptly near the fuselage, and it was entirely beyond repair.

There was now only one thing left to do. We must try and take the *Detroiter* to Point Barrow. In less than an hour the wreck of the *Alaskan* was dragged from the field, and the *Detroiter* wheeled out ready for the flight. At first I proposed to take Wisely as pilot and Hufford, the mechanic, with me to Point Barrow. But I was most anxious that Lanphier should have an opportunity of seeing the country north of the Endicott Range, and when Wisely seemed disinclined to go unless Lanphier was with him, we left Hufford behind and Lanphier took his place.

By this time Spring was full upon us. No snow was left on the ground at Fairbanks and the mountains were constantly covered with clouds and storms. It was doubtful if we would ever get clear weather on the Endicott Range again that season. We taxied the machine to the end of the runway and with a load of over seven hundred gallons of gasoline, forty-five gallons of oil and all our equipment we took off after a short run and headed for the mountains.

We soon came to clouds and turned right and left looking for a clearing through which to pass. In this manner we got into the center of the cloud mass, from which it would be difficult to escape. It was just as safe to attempt to continue the journey as to attempt to return to Fairbanks. So we kept on flying one way and another; climbing as much as possible, and edging further and further north until at last at an altitude of eleven thousand feet we crossed the mountains, came out of the cloud and found ourselves over a low fog-bank which covered the tundra.

So far we had experienced no difficulty with the machine. As a matter of fact this one with its three engines and its ability to climb to eleven thousand feet with a load was safer than the single engined machine. I felt certain that the

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EIELSON LAUGHS

© *Pathé News*

A THAW AFTER A SNOWSTORM CAUSED ICICLES TO FORM ON THE TRAILING EDGE OF THE WING weather would be clear at Point Barrow and it was only a matter of keeping a compass course to get there.

I gave the pilots the compass course and since there seemed to be nothing urgent I settled back in the cabin and proceeded to eat my lunch. Suddenly without warning the plane nose-dived down and down, steeper and steeper. I could hear the wind whistling through the struts of the engine mounts. We must have been travelling at the rate of almost two hundred miles an hour, when with a snap Wisely pulled the machine out of the dive and flattened out just a few feet above the tundra. He had decided to go beneath the fog and follow a river valley he had seen below. We knew from previous experience that we would most likely find clear weather at Barrow, so I hurriedly wrote a note, asking the pilot to go above the clouds and steer a compass course. After a few minutes the machine was turned and flown back to the edge of the fog and we climbed again to five thousand feet, and set out in the general direction of Barrow. But our course soon became most erratic. I passed a note to assure them that the course I had given was correct, but no one took the message.

I could see some struggling going on in the cockpit and learned afterwards that Wisely had made up his mind that it was too dangerous to fly onward and was trying to return to Fairbanks, while Lanphier, willing to take a chance, was fighting for the controls. The machine tumbled and twisted for several minutes, but at last straightened out on a course, which eventually brought us to Barrow.

A safe landing was made and the machine was taxied to the end of the runway. We filled the tanks with gasoline and hoped that on the next day we would be able to set out on a flight across the Arctic ice. But when morning came a thick fog had settled down above the ice. While it might have been possible to climb above the fog and fly in clear sunshine above it, we could not have seen the country over which we passed and no useful work could have been done.

Day after day, this foggy weather continued; sometimes it would lift for an hour or so, but always before we could get our engines going it would cloud over again.

We were in constant touch with the outside world by wireless, and learned that Byrd and Amundsen were ready at Spitsbergen to make a polar flight. Shortly after we learned that Byrd had flown to the Pole and back, and that Amundsen was about to start. Then came the news that the *Norge* was on its way. We calculated the time and on the evening of the thirteenth of May we set watches hoping to see the airship as she passed. The weather had been very dull early in the day, but toward evening the clouds broke up just a little, and in the distance we saw a small dark object threading its way between them. We recognized it at once as the airship.

That was perhaps the greatest thrill of my life, because in 1919 I had planned to use an airship to make an Arctic flight. At that time it was not possible to persuade any one that an airship could be used successfully in polar regions. The manufacturers of airships in England and Germany refused to sell an airship for a polar flight although my friends were willing at that time to pay any price the manufacturers asked.

Since my earliest experience in the Arctic, I had believed that it would be possible to use both airplanes and airships for polar flying, and as I stood on the coast at Point Barrow watching Amundsen, Ellsworth and Nobile pass, it was the realization of my plan. Airships had proved useful in the polar regions. It mattered little to me who was at the control or who had organized the expedition, the fact that the machine had safely crossed the Arctic was sufficient.

The weather was still too foggy to enable us to do any useful work, although when we heard a few days later that the *Norge* had not sighted land north of Point Barrow, it was still more essential that we should fly to the northeast and northwest of Point Barrow to explore the unknown area.

For three long weeks we waited and waited and watched at Point Barrow for a break in the weather, but thick fog continued to blanket the Arctic Ocean. At last on the fourth of June we cabled the Board of Control at Detroit that it was no longer possible for us to do any useful work that season, and asked if they would support the Expedition for another year. We received a reply stating that Detroit would stay with us until the job was done. It was impossible for them to judge conditions and they said that they would agree to anything we thought best.

There was no doubt in our minds that the best thing to do was to return, store our equipment and try again next year. We cabled Detroit that we would return as soon as possible, and after several days' delay we managed to climb through and fly over the clouds back to Fairbanks.

We stored the machines at Fairbanks and returned to Detroit. All the members of the expedition were dismissed.

It was found on going into the accounts that the expedition was then about $30,000 in debt and an attempt was made to sell one of the machines to get funds to pay our bills. It had been agreed that this machine was to become at the end of the expedition my private property.

As the actual money made available from Detroit up to that time amounted to less than $30,000.00—about a third of what had been promised—and as the machine was the only available one suited to our requirements I refused to sell it. This decision brought about some confusion in Detroit.

The Detroit Aviation Society at last agreed that if I accepted the responsibility of paying to them twenty per cent of my earnings until $30,000.00 had been paid them, they would allow me to retain the machine and the remnants of equipment left over from the expedition. I would then be free to seek elsewhere for support and continue my program in the Arctic.

PART II

CARRYING ON

CHAPTER I

NORTHWARD ONCE MORE

IT was taken for granted that Amundsen, Ellsworth and Nobile during the flight of the *Norge,* proved that no high land existed between the North Pole and Point Barrow. Our flight of two hundred miles over the Arctic pack-ice in clear weather had confirmed my opinion that landings could be made on the sea ice far from shore. Therefore plans for the continuation of our work were slightly altered.

Instead of setting out on non-stop flights from Barrow, six hundred miles northwest and northeast and back again, we planned, if no land was seen, to come down on the ice and take a sounding.

It might have been possible to have landed with the three-engined Fokker machine, but it was too heavy for two people to move even with a block and tackle. For such work we needed a smaller machine. A biplane, capable of taking off in short distances, and with a cruising range of about sixteen hundred miles, would best serve our purpose for the short flights. Should we succeed in carrying out the short flights we could then make the flight to Spitsbergen with the big Fokker. Personally I was not much interested in the flight direct from Barrow over the Pole to Spitsbergen. It would be a feat of interest to the world and of value in connection with the development of aviation, but it would add little to our knowledge of geography. There seemed no great difficulties in the way of such a flight. The course would follow a line of longitude and by using a sun compass, eliminate much of the troubles in navigation.

Having determined to use a small biplane in 1927, we had to consider the question of which make and still more to the point the means of acquiring one. Carl Fritsche, as usual, was the first to suggest a useful plan. He proposed that we should investigate the possibility of using a Stinson biplane. This machine was built in Detroit after the design of one of our supporters and had already proved its worth. We called up the Stinson factory and went into the question of design and possible range, with Eddie

Stinson. It seemed from our calculations that a Stinson machine would serve our purpose. Fritsche's idea soon bore fruit.

The management of the *Detroit News,* which shared the copy of the North-American Newspaper Alliance, and whose editor, Mr. George Miller, was President of the Alliance, had formerly engaged lecturers to entertain the school children in Detroit. It now became possible by arrangement with Mr. W. E. Scripps and Mr. Miller for me to lecture at all the schools in Detroit and suburbs. In this way we could in a measure repay the school children for the few cents each they had subscribed toward the expedition. The lectures were free to the scholars, but the *Detroit News* generously offered me five thousand dollars for my services. I immediately agreed that this entire amount should be used to continue further explorations in the Arctic. Time being limited, the Visual Education Branch of the Detroit Board of Education arranged for me to give one hundred and seven lectures during a period of six weeks or an average of five each school day.

The amount received for this work together with three thousand dollars extra which I subscribed, an engine saved from the three engined machine, and the supplies remaining from last year, would be sufficient to provide us with one fully equipped Stinson machine, as well as the Fokker machine already available.

By using the sixty-three foot wing on the Fokker Liberty engined fuselage we would have a machine capable of making the flight from Barrow to Spitsbergen. Thus the matter of equipment was taken care of, but it was still necessary to provide funds for the running expenses of the Expedition.

I approached the North-American Newspaper Alliance, that had paid twenty-five thousand dollars the preceding year for the privilege of gathering news. The management flatly declined to render any further financial assistance. Other newspapers offered funds for exclusive rights, but in view of the kindness of the *Detroit News,* one of the Alliance's principal members, I did not care to accept outside help.

But the money had to be produced somehow! I was at the point of approaching some personal friends in Detroit, when the management of the *Detroit News* came forward and volunteered to pay all the running expenses of the expedition. It was a most generous offer. A meeting was called to discuss this matter and to bring it to the attention of the Detroit Aviation Society.

Doctor Bowman, Director of the American Geographical Society, came from New York to attend the meeting and took the trouble to explain the scientific value of the work in hand.

He stated that the Geographical Society would sponsor any further effort made by the expedition. Doctor Bowman's attitude greatly influenced the members of the Detroit Aviation Society and the management of the *Detroit News*.. Much to my surprise, the Detroit Aviation Society agreed then and there to provide a second Stinson machine to be used for spare parts or in an emergency. Learning this, the North-American Newspaper Alliance agreed that for the right to use exclusively all news concerning the Expedition they would provide wireless communication.

The Expedition was again on a sound financial footing. I was still under the promise—according to a resolution passed on my return from the first year's work—to repay the Detroit Aviation Society the sum of thirty thousand dollars.

The Stinson machine I had ordered was almost complete and I took it for granted that the second machine, promised by the Detroit Aviation Society, would be ordered immediately. Duties called me to New York for a period of two weeks. When I returned to Detroit my machine was ready for its test flight, but nothing had been done with regard to the second machine. With the aid of Mr. William Mara, Secretary of the Stinson Company, and also an active member of the Detroit Aviation Society, inquiries were made. We discovered that the Aviation Society had concluded that it could not keep its promise to provide a second machine. I was quite prepared to go on without the second Stinson. As a matter of fact I would have been better pleased to do so. We had the Fokker machine for use in an emergency and a third machine would only add to the responsibility and expense.

But Mr. W. E. Scripps of the *Detroit News* most generously came forward and offered to provide and loan to the expedition a second Stinson machine, an extra pilot and to pay all the necessary expenses. The *Detroit News* would also supply their own correspondent, who was to act as manager for the expedition. In spite of the delay in connection with the second biplane, all preparations were made on scheduled time and the machines and the members of the expedition proceeded to Seattle by train.

Carl Ben Eielson had again agreed to be our chief pilot. Alger Graham was chosen as second pilot. Orval Porter, a mechanic in the service of the Stinson Aircraft Corporation, was released from duty in order that he might accept service with us. A Mr. A. Maxson Smith was chosen by the *Detroit News* with my approval to act as their representative. He would have as his assistants Howard Mason, the wireless operator who had been with me the previous year, and Walter Hemrick, another wireless operator from Seattle. All the members of the expedition except Graham left Seattle on February 11, 1927. Graham was to accompany the machines on the boat leaving one week later.

We reached Fairbanks without incident. By the time Graham arrived with the Stinson machines the sixty-three foot winged Fokker machine, powered with the Liberty engine, was ready for flight.

We unloaded the Stinsons from the train and carried them to the hangar. The machines were in many pieces and crated. Although they were expected to be interchangeable in all respects except the engine, we found that scarcely anything fitted anywhere. One machine was assembled from the parts that fitted best. This was done in a few days, but it took us nearly two weeks to cut and fit the parts of the other machine.

We had much difficulty in getting skis suitable for the Stinson machine. One pair of Severski metal skis was obtained and while they were intended for a much lighter machine they were sufficiently strong for our purpose in all ways except one. They were too weak to stand much side thrust, a factor to be considered if we had to make a forced landing in a cross wind at any time. Their fore and aft strength was sufficient and under favorable conditions the Severski skis were excellent. We were afraid they would not stand rough treatment. However, as they would give us about two miles an hour more speed through the air than we could attain with any other type I decided to use them.

It was imperative to have other skis and we searched long before finding suitable hardwood for their construction. Finally Eielson discovered at Milwaukee some timber that would serve our purpose. This wood was dressed and forwarded to Fairbanks. While the other men assembled the machine, I constructed two pairs of skis in the workshop of the Samson Hardware Company of Fairbanks. The preliminary tests of the Stinson machines in Michigan had proved that they were capable of carrying the load we required, and further tests at Fairbanks were quite satisfactory.

We found that the sixty-three foot Fokker machine powered with the Liberty engine took off well and flew easily at low altitude, but would not climb very well with an overload. The maximum speed was a hundred miles an hour. Even so it would have a range of nearly three thousand miles and serve for our flight from Barrow to Spitsbergen.

We planned to take the three machines to Barrow at the same time. Eielson was to fly the Fokker with A. M. Smith, the *Detroit News* representative, and Howard Mason, as passengers. I had hired Noel Wein, an Alaskan pilot, to fly the second Stinson and he would take with him Orval Porter, the mechanic. Alger Graham would fly with me in the other Stinson. All three machines were placed on the runway and prepared for flight.

Eielson was the first to attempt to take off. Light snow had fallen during the night, clogging the surface of the runway, and the machine failed to leave the ground. While taxiing back for a second attempt one of the skis on the Fokker machine dropped into a deep furrow at the end of the runway, and was so badly bent as to keep the machine from flying.

This episode demanded a change in our arrangements. We thought best to leave the Fokker machine behind until conditions were such that we could use wheels at Fairbanks. This would mean leaving behind two men and it fell to the lot of the newspaper representative and the mechanic to stay at Fairbanks. The Stinson plane would not accommodate more than two persons in addition to equipment. It was essential that the radio operator should go and at the worst he could send out messages to Mr. Smith at Fairbanks describing the bare facts concerning our progress and Smith could re-write the story at Fairbanks. It took the greater part of a day to re-arrange our loads.

Meanwhile Mr. Smith was busy trying to find some way of getting to Barrow. We would be glad to have him with us because of his ability as a writer and because of his pleasant, honest and friendly companionship. But there seemed no way to take him unless we hired a machine from the Fairbanks Airplane Corporation, which would be an expensive proposition. At first it seemed out of the question, but just before we were ready to leave, it was generously arranged by the Fairbanks Airplane Corporation for Pilot Joe Crossan to fly Smith to Barrow in a little Swallow biplane, stopping at Wiseman to refuel on the way. In less than an hour after this plan was made, Crossan, with Smith as passenger in the open cockpit of the Swallow, set out.

The Stinson machines were warmed up and an hour later Pilot Graham in No. 2 machine, with Howard Mason as passenger, tried to get off. The temperature had warmed towards the middle of the day and the sharp tail-skid cut deeply into the snow. Several attempts to get off failed and we had to delay long enough to install the wide-set wooden tail-skids prepared for such an emergency. These tail-skids, while assuring a quicker take-off, were likely to interfere slightly with the performance of the machine in the air. With the tail-skids attached Graham got off without further trouble. Eielson and I followed immediately in the *Detroit News No. 1* and set our course for Wiseman. We climbed slowly as we approached the Endicott mountains, at the foothills of which Wiseman is located.

When we caught sight of the town we were flying at an altitude of 8,000 feet, but through the clear cold atmosphere we could see the Swallow on the landing field and a number of people clustered about it.

A comprehensive system of signals to be laid down with strips of red cloth had been arranged in order to avoid possible confusion. In the event of all being well, no signals at all would be set. We circled the field at high altitude for some time and until we were sure that the people below had seen us. Although there was much activity about the Swallow there was no sign of an attempt to take off and no signal was displayed. As we did not care to delay more than half an hour, we signalled with our wings that we were proceeding to Barrow and continued our course, feeling sure that there had been no serious accident at Wiseman.

The Endicott Range was clear, but beyond, lying over the flat tundra, was a blanket of fog such as we had found on each trip last year. Believing, from previous experience, that we would find a clear belt at Barrow, we continued our course with Graham in the *Detroit News No. 2* following close behind. We found that we could, in the *Detroit No. 1,* leave the other machine behind by speeding the engine to 1,800 revolutions. We were using a Curtis Reed propeller, while Graham's machine had a Standard Steel propeller set to give 1,900 revolutions in the air.

We struck the coast a few miles east of Barrow and, finding the way clear, landed on the lagoon at Barrow after about a seven hour flight. In the *Detroit No. 1* we had ample gasoline in reserve but Graham, in the *Detroit No. 2,* owing to his engine having been turned faster and because of the several unsuccessful attempts to take off, landed with only three or four gallons left.

The white community and the Eskimos at Barrow gave us a glad welcome. We unloaded our spare parts and wireless from the machines and in an hour or so Mason had the radio working and we were in touch with Hemrick at Fairbanks. We learned that night that Crossan and Smith were detained with radiator trouble but they expected to continue to Barrow in the morning.

With our radio set at Barrow we could advise them if the weather was unsuitable but as it was clear at Barrow the next morning, we expected the Swallow to appear some time during the day.

It was, however, quite an undertaking for

Crossan, who had never flown over the Endicott Range, to set out with Smith, who was also inexperienced in Arctic travel, and attempt to find Barrow, which lies on a coastline devoid of any conspicuous markings. They had been carefully instructed to be sure to strike the coast either at one side or the other of Barrow and then, knowing which side they were on, they could follow the coast until they came to the village. The side of Barrow they would aim for would depend on the wind and weather. It being a clear day on the coast, Crossan came to the ice about thirty miles east of Barrow and by cleverly reading his map soon arrived at the village.

To have all our party safely at our northern base was a great relief. Crossan would stay over for a day and return to Fairbanks via Kotzebue and the coastal route on Monday, weather permitting.

CHAPTER II

STRIKING OUT INTO THE UNKNOWN

SUNDAY was fine. An unbroken spell of good weather had prevailed at Barrow during March, but if usual conditions were to follow, we might look for a storm at any time.

By Sunday night Mason had arranged his base wireless in a satisfactory manner. Mr. Harry Riley, who was in charge of H. Leibes & Company's Whaling Station, gave us every facility and rendered all possible aid, even to vacating half of his private office to accommodate Mason and his wireless set. Our old friend, Fred Hopson, again outdid himself in his hospitality and welcome.

We were sorry to hear that Hopson's son Sam—who was our most useful helper at Barrow last year—had recently died as the result of an unfortunate accident.

Dr. Newhall and our other friends at the Presbyterian Mission Station and Mr. and Mrs. Sylvester of the Educational Department, also gave us a cordial reception.

Sunday was devoted to photography, checking of stores and supplies and weighing out rations to be taken on the ice trips. Although a storm might be expected and was generally experienced at Barrow some time between March twenty-first and April fifth, I hoped to be able to carry out one short flight to the north-northwest before the storm period came.

These storms we knew from past experience might range from one to seven days' duration, and I was particularly anxious to get at least one flight over before facing any prolonged delay.

Monday the atmosphere was clear with a light northeast wind, and Joe Crossan, in his Swallow, headed down the coast on his way back to Fairbanks.

We filled the gas tanks of the Stinson No. 1 machine and checked the compasses while Eielson and Graham carefully examined the engine.

At Detroit we had had some trouble because of a peculiar greyish deposit thrown down, we believed, by the contact between gasoline and the product used to weld the tanks. No deposit from the tanks had gathered in the pipe line or carburetor in the seven hours' flight from Fairbanks, so we thought that this menace had been entirely eliminated. Our necessary load of gasoline, oil supplies and scientific equipment was placed in the machine Monday afternoon and by dinner time, almost all preparations had been made for the flight. If the weather appeared satisfactory on the morrow (March twenty-ninth), we would set out.

When the labor of loading and equipping the machine was done, I went carefully over the possibilities and considered proposed routes. If we had, as expected, a light northeast breeze with the possibility, if it did change, of its swinging clockwise toward the southwest by evening, we intended to follow a course toward 78 degrees north Latitude, 180 degrees Longitude.

Should we reach that point we would then make a landing and take soundings. Our further movement would be guided by the result of the soundings. If the soundings were shallow and indicated land not far ahead, we would continue on the same course, but if the soundings were deep, showing that we had gone well beyond the Continental Shelf, we would turn straight south for two hours or about two hundred miles and take another sounding. From the southerly position, no matter what the soundings indicated, it would be necessary, because of a reduced gas supply, to return direct to Barrow.

We would, if we could carry out this plan, prove many things. From the character of the ice we passed over, we would get some idea as to whether there was an eddy off Point Barrow that kept the ice permanently in that locality. As we proceeded, we might get, from the direction of leads in the ice, some indication of the general wind and sea current and possible obstruction to ice movements, such as shallows, islands, et cetera.

If we could land and take a sounding we would first of all prove my contention that safe landings could be made on sea ice far from shore and get some information as to the depth of the Arctic Ocean and the extent of the Continental Shelf north of the east end of Siberia. If the soundings were shallow, we could, by using the snapper on the manual sounding gear, take bottom samples, bottom temperatures and water samples from near the bottom. I did not propose, in view of the possibility of an approaching storm, to take manual soundings and bottom samples if the ocean was deep at the point of landing. We would confine our work to the soundings taken with the Sonic apparatus.

A sounding, if it was deep would be the most valuable observation in that direction and our object would then be to gather information from other areas. By turning south two hundred miles from the first point of landing, our course to Barrow would then be about southeast. Because of the elapsed time, provided the wind changed as expected, we would have a beam wind or perhaps one slightly in our favor, as would be most likely when we set out in the morning.

On the return journey we expected the wind to be on our starboard side and I planned to head slightly south of a direct course to Barrow in order that any error would still put us between Barrow and Wainwright Inlet. We knew that much good gasoline was available at Wainwright, and in the event of a forced landing out of gas on the coast we could go to either Barrow or Wainwright for further supplies.

By midnight on Monday, the others, except Smith and myself, were sound asleep. Smith, the most careful and helpful of men, had given me so much assistance that all my official papers were in order. Final instructions for the people remaining at Barrow were written and my courses and estimated calculations were set out on charts and notebooks. Howard Mason before going to bed had given a final check on the watches used for navigation and all that remained to be done before actually setting out, was to climb into the air and with a full load check the deviation of the compasses. I had previously found that the distribution of the gasoline in the tanks had some influence on small compasses when the gas tanks were very close to the compass.

Soon after midnight Smith and I turned in. At two A.M. I awakened and examined the weather. The temperature had dropped several degrees and was then forty-two degrees below zero (the thermometer used on the strut of our plane read seven degrees below the one used by Dr. Newhall at the hospital). A northeast breeze was still blowing and the barometer had dropped somewhat. It had been dropping slightly for the three days we had been at Barrow, but not quickly enough to indicate serious trouble. I believed the slight extra drop in the barometer was mostly due to the drop in temperature. At three A.M. the breeze had almost calmed, the sky was clear about the whole horizon and with the low temperature, I looked forward to a clear and almost calm day. At four-thirty the others of the party were awakened. An extra stove was placed under the airplane engine and the oil put to warm on the kitchen stove.

Everyone with the Expedition had worked with a will and each one knew his job. There was no hurry or bustle and at five-thirty Eielson and I had had a snack of breakfast and all were assembled at the machine. Mason gave the wireless set a final look over. Eielson and Graham tested the engine, which was then quite warm beneath the canvas cover and final instructions were distributed. The wind from the northeast had slightly increased.

I returned to take one last look at the barometer in the kitchen and found that it was at the same reading as it had been at three A. M. But here, I must admit neglect and an error. I had used that barometer each morning last year and on the three mornings of this year and I had noticed a rise owing to the higher temperature after the kitchen stove had been going for some time. But, on the morning of our first flight over the ice, I failed to allow for the extra warmth created by the stove going full on. The fact that the barometer read the same at six A. M. that morning as it had at three A. M. should have warned me of a considerable drop. However, I doubt if cognizance of this would have deterred me from starting that morning. I had expected, and would welcome some such condition which would, under usual circumstances, give us a tail wind on our outward journey and a side, if not a favorable wind, for the return, assuming of course, that we would make considerable southing at our extreme range from Barrow.

When I returned to the plane the engine was running smoothly. It was pronounced warm and ready for service by Graham and Eielson, so without formal adieux, I climbed into the cabin; Eielson gave the engine the gun and with Smith and Graham at the wings, assisting us, we glided smoothly into the wind and after a run of less than half a mile, we were in the air. Eielson slowly climbed for altitude and in a few minutes, at 1,000 feet, we flew along the coast, turned and came back, then at right angles, checking our compasses. I found a deviation of five degrees on a northwesterly course. The earth inductor and the Aperiodic compasses were set to 302 degrees and Eielson swung the machine slowly until it steadied on the course and at six A.M. we struck out into the unknown.

I noticed that the angle the sun made with fore and aft direction of the machine was 165 degrees.

CHAPTER III

THE BETTER PART OF VALOR

OUR equipment and load consisted of a Stinson standard biplane, with much of the dihedral rigged out of the lower wing, powered with a J-4 A engine, magnetos and engines closely cowled to the top of piston travel. Curtis Reed metal propeller. Carburetor intake supplied with hot air from about exhaust stacks. (No other form of air heater for engine used in flight.) All oil pipes and exposed gas pipes, carburetor and intake manifolds served with asbestos cord. Severski metal skis fitted in place of wheels. A ten by twelve inch wooden tail-ski attached to tail-skid. One 172-gallon tank designed to form both seat and back rest installed in the cabin. One thirty-gallon tank installed in cabin on the floor beside the feet of the pilot. The two cabin tanks were connected through a wobble pump to the center

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THE THREE ESKIMOS WHO BROUGHT A MESSAGE FROM THEIR TRIBE TO THE EXPEDITION HEADQUARTERS AT FAIRBANKS

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AN ESKIMO BOY AND HIS PLAYMATES

and starboard wing tanks with a return line from each. In the return line was a section of heavy steam-gauge glass for observation of overflow. The navigator's place was behind the large cabin tank. Drift indicator opening in the floor. Sliding doorway in roof of cabin for convenience of navigator. Fore and aft of this doorway were fixed two large protractors to be used as a pelorus to measure the sun's bearing and azimuth.

The flying instruments made by the Pioneer Instrument Company were: compass, tachometer, oil pressure gauge, oil thermometer, airspeed meter, altimeter, bank and turn indicator.

Special navigation instruments included an Aperiodic compass, Earth-inductor compass, drift indicator, course and distance calculator, Pioneer bubble octant, pocket sextant, a set of charts, curves and tables prepared by Mr. O. M. Miller of the American Geographical School of Surveying.

The sounding gear included a portable Sonic sounding gear donated by the American Geographical Society. This Sonic sounding gear consisted of a pair of telephone receivers attached to a battery and amplifier and to which in turn was attached a detector which was to hang in the water not less than six feet below the surface. For detonating there was a battery and switch connected to a long length of insulated cable at the end of which was attached, as often as required, a detonator similar to a rifle cartridge and about three inches long and three-eighths of an inch in diameter at its larger end. A stop-watch, reading to one-hundredths of a second, was started as the charge was detonated and stopped as the echo was heard in the telephone receiver.

The other sounding gear carried was a special manual gear made by adapting a cinema rewinder and a film spool, on which was wound 10,000 meters of a specially made enameled silk fishing line. With this line could be lowered apparatus for obtaining bottom samples of the ocean floor, water samples and temperature of water at two levels. This water sample collecting apparatus was specially constructed by me at Fairbanks, and was made by brazing four brass tubes to the fixed lower spring cap of a Standard Hydrographic Department snapper for obtaining bottom samples, the tubes fitting inside the coiled spring. To the top of the upper brass spring cap four corks were attached. When the snapper jaws were set apart the corks were elevated above the top of the brass tubes and when the jaws were automatically released, as the snapper touched the bottom, the closing spring securely corked the tubes in which would be a sample of water from near the bottom. A reversing thermometer was attached directly and firmly to the head of the snapper and arranged so that the thermometer would fall clear of the snapper device. Thus, this instrument in itself was sufficiently heavy to lower the fine fishing line rapidly to normal depths, and if great depths were met provision was made to attach weights with stiff steel loops so that they would be automatically released when the snapper touched bottom.

In the machine we carried as supplies 225 gallons of gasoline and seven gallons of oil in the tanks. Two separate gallon cans of hot Pennzoil were carried in reindeerskin bags for use in emergency and, if needed, this spare oil could be poured into the oil tank through a filler cap, handy to the pilot while flying.

Our supplies included ten pounds of Norwegian biscuits, twenty pounds of Norwegian chocolate, five pounds of Powell's Army Emergency Ration, three pounds of mixed pemmican, chocolate and biscuit prepared for consumption during the flight. One large thermos bottle full of black coffee—a gift of Fred Hopson. I had prepared as an extra precaution ten pounds of pemmican and five pounds of Norwegian biscuit, but just before starting I removed this bag of supplies from the plane with the firm belief that if absolutely necessary, food could be obtained on the ice. Nevertheless, I believed it wise to carry as much food as possible without overloading the plane, and particularly because of the possibility of slight injury in landing and a forced confinement to one area as a result. In that case it might be wise to have with us a supply of condensed food. If both of us were able to travel on foot after a forced landing, I believed from my experience with the Stefansson Expedition, that it would be possible for me, knowing the habits of seals and bears, to obtain food sufficient for the journey ashore.

As a necessary precaution we carried two Mannlicher .256 rifles, 400 rounds of ammunition and a pair of five power Mirakel binoculars. We also carried thirty feet of fish-net, some fish hooks and lines for the purpose of catching small birds near cliffs, as well as fish.

A limited supply of engine tools, some new spark-plugs, magneto parts, hacksaw, a small axe, an Alpine axe, an icepick, a meshed, hornframed, long handled shovel for removing ice from small deep holes; an apparatus for securing seals through young ice and a device for retrieving seals from the water, were carried. The four articles last mentioned were of Eskimo design and purchased from my Eskimo friends at Barrow.

For preparing food we carried a Primus stove that fitted inside two nesting aluminum cans, two enamel cups, three spoons, three forks and three aluminum plates.

We each carried a combination pocket knife and a six-inch skinning knife in a sheath. There were also a twelve inch, a fifteen inch, a twenty-four inch knife and a twenty-four inch double edged saw for snow-house building, made with a specially large handle to accommodate a mittened hand.

Two sets of small, strong but very light snowshoes were carried; also two Indian type backpacks with extra long lashings.

A small Burroughs-Welcome First Aid Kit for Air Travelers was carried and in addition, I provided a special Ophthalmic set, some extra soda-mint tablets, some chewing gum and one pound of dried coca leaves for emergency. From previous experience I had discovered that to chew gum, soda-mints and coca leaves in small quantities would relieve pangs of hunger and gave me, individually, a certain amount of stimulus. (Later when this mixture was voluntarily experimented with, Eielson derived less benefit than I did from the leaves and soda. One half pound of chewing tobacco was carried and after Eielson had accustomed himself to small quantities of this, he found the tobacco a greater relief. I preferred the coca leaf mixture.)

When we started out Eielson wore as clothing: a flying helmet; aviator's goggles; a single reindeerskin parka, hair out; a sheepskin, natural wool lined sports blouse; khaki army shirt; light woolen combination underwear; army breeches; narrow canvas belt; two pairs of heavy Angora Brand woolen socks; one pair of cotton socks; a pair of sealskin Eskimo boots with the hair of the skin worn outside, reaching above the knees and thick insoles in the boots. Over all he wore a light khaki suit of coveralls. He used a pair of muskrat, woolen-lined mittens and carried a chamois leather face mask; a pair of dark green snow glasses and a water-tight box of matches.

I wore a flying helmet; aviator's goggles; silk B. V. D. underwear, a light silk shirt; a single deerskin parka; reindeerskin trousers, lined with loose khaki knickers; long silk scarf for belt; two pairs Angora woolen socks; one pair cotton socks; a pair of Eskimo boots with the hair of the skin worn inside and reaching above the knees, with rope-yarn insoles. Over all I wore a light suit of khaki coveralls. I used a pair of dogskin mittens and carried a pair of dark green snow glasses and a waterproofed box of matches.

In a bag as spare clothing we carried two reindeerskin parkas; one pair of reindeerskin breeches for Eielson; two suits of heavy woolen combination underwear; two pairs khaki trousers; four pairs reindeerskin socks; six pairs Angora woolen socks; two pairs sealskin Eskimo boots, with hair on outside; two pairs sealskin Eskimo boots, with hair on inside; four sets of insoles; two pairs of sealskin mittens; four pairs of woolen mittens; two pairs of waterproof sealskin mittens; stout, curved glovers' needles and sinew for sewing.

For sleeping accommodations, we expected to use snow-houses on the floor of which we would set down snowshoes and on these place four medium sized sealskin pokes. (These pokes were originally intended for use in crossing open leads of water. Blown up they would float and four tied together would make a serviceable raft.) On the deflated seal pokes we could place the reindeerskin bags, used for keeping the extra oil warm, and on top of the reindeerskin a light linen tent—carried mainly for possible use in the summer or for a snow-house lining in the winter. For use on top of this we had two one-man reindeerskin sleeping bags. The mouth of the bag was edged with blanket, arranged so that it could be drawn about the shoulders with a drawstring.

No special material for making sleds was provided because we believed we could, in emergency, make a temporary sled from parts of the plane. Furthermore, I had always felt it would be more satisfactory—if we found ourselves within a short distance of the shore—to carry our equipment on our backs instead of dragging it over the rough pack-ice.

As wireless equipment we had a short wave transmitting set built by Lieutenant Malcolm Hansen of Washington, D. C., and used on the Detroit Arctic Expedition. For power, we used a hand driven generator fitted with an attachment for transmitting automatically several combinations of code letters. A comprehensive code was arranged by Mr. A. M. Smith and much of the code could be sent with the automatic device. By turning the switch the machine could be used with the ordinary telegraph key.

We selected all of our equipment as carefully as we could—for in our case, a wise choice was certainly the better part of valor.

CHAPTER IV

THE LANDING IN THE DARK

AS we left Barrow and headed for the ice we were at an altitude of 1,000 feet and with the engine turning over at 1,600 revolutions per minute our air speed was 88 miles an hour. Our compasses were set at 302 degrees. The temperature on the ground was 42 degrees below zero but as expected, it was warmer in the air. At 1,000 feet the strut thermometer read minus 32 degrees. The temperature in the cabin of the plane was plus 18 degrees Fahrenheit.

My first observation was for ground speed and drift. Wind velocity in the air was greater than on the ground and its direction required a five degree correction to maintain our course, but increased our speed over the ice by ten miles per hour.

Near shore a few irregular open leads, parallel to the shore-line west of Barrow, were crossed. The snowdrifts were conspicuous, running N. E.-

S. W. At 6:50 we passed a wide lead between badly broken, but little ridged ice. The ice floes were dotted here and there with small patches of smooth ice suitable for landing fields.

By 7:40—with the engine throttled to 1,500 revolutions—our air speed was reduced to 82, but with increasing wind our ground speed of 98 to 100 miles per hour was maintained. The snow-drifts were trending a little more northerly than they had nearer the shore.

At 8 A.M. I noted: "All O. K. Eielson seems happy and I have every confidence in him and everything else on board." We were then passing over older ice and high pressure ridges were noticeable.

At 8:15 we crossed a lead a mile wide. Some of the surface was slightly frozen. At other points the water could be seen still and clear. At our altitude the wind had increased.

Fifteen minutes later haze and cloud appeared ahead and we climbed slightly to pass over it. Strips of cloud a few miles wide crossed our course, as far ahead as we could see. Until 9:30 we intermittently crossed clouds through which we could not see and haze through which leads and rough ice showed dimly.

At 9:45 I noted: "Not a crack for fifteen miles.

No real old paleocrystic ice yet. The ice looks older and checkered with cracks, but looking toward the sun the cracks are recognized as worn down pressure ridges."

At 10:20 the engine kicked once or twice. Eielson speeded it up to 1,600 revolutions and worked the altitude control to backfire and clear the carburetor in case ice might have formed. The engine spluttered for two minutes, then settled down to a steady roar.

At 10:30 I wrote: "Engine O. K. again. Now crossing over old paleocrystic ice with many narrow leads and few good landing places. My time too fully occupied to look for animal life on the ice. Have tried all lengths of wire, but antenna current on wireless is scarcely visible on meter. Doubt that messages are leaving, but have sent every half hour since leaving Barrow. My eyes are feeling strain of wind coming through the hole in the floor for the drift indicator and taking sights of sun for altitude and azimuth."

Far ahead the ice looked old and much ridged. It appeared as if we were approaching an area of greater disturbance and pressure. As soon after eleven as possible I intended to land, take soundings, fix our position and turn south for about two hours.

Opposite 10:50 my log book shows: "Engine kicking all the time. Took bearing for drift. Wind now S. E., about 12 miles per hour. Will circle over young ice patch in case engine goes wrong."

From 10:55 to 11.05 the engine kicked, knocked and missed badly. Five minutes later a message to Ben said: "That's good ice to land on. Think we had better land and fix it?"

By 11:15 we were on the ice. The ice beneath us was dull grey and flat, without ridges or snowdrifts.

Beautiful flower-like crystals—two inches high, sharp and brittle as steel in the temperature of 30 below zero—covered the surface and cut into our duralumin skis.

The plane came to a rest quickly. My first thought was to take a sounding. Eielson hurried to examine the engine. To hole through the ice three feet thick, with an icepick, took eight minutes—then the icepick broke. I mended it with some screws from the cabin of the plane and a second hole some thirty yards away took slightly more time. Two holes were necessary for the Sonic depth-finding apparatus.

Eielson left the engine to detonate a charge. There was a 7.3 seconds interval between the detonation and the echo. Rapid calculation gave over 5000 meters as the depth. With the roar of the engine running I might have been mistaken and asked Eielson to shut it off. He did as requested and fitted the receivers to his ears. I completed the electric circuit and detonated a charge. Eielson announced 7.25. (Long after we were back in civilization, Eielson grinningly told me what flashed through his mind at the time I asked him to stop the engine. It was: "Go ahead and take the sounding; if we stop the engine we will never get it started again and nobody but God, and you and me will ever know what the sounding is.")

One of our regrets at the time was the fact that clouds covered the sky and we could not get a sight of the sun for accurate position.

In less than thirty minutes we were both at work on the engine. For two hours we fiddled and sought for the trouble, starting and stopping the engine to keep it warm. Then cowling and carburetor had to come off—nippy work on fingers at 30 below. Assembled again the engine gave 1,400 revolutions per minute. This was not as it should be, but we thought it might take us off and after five attempts we rose from the ice and headed for Barrow.

At work on the engine we had failed to notice the increasing wind and clouds. Once in the air we were enveloped in haze. Ten minutes later the engine started kicking and stalling again. There was nothing to do but land. Three times we approached the ice before being certain of a safe landing field. The sun was darkly obscured and visibility poor.

It was undoubtedly my actual experience on foot on the ice that enabled me to detect the unsuitable surfaces for landing. The surface on which we did land had looked good from the air, but in the hazy lights I could not have sworn to this until we came within a few feet of the surface.

The engine seemed to be getting very poor magneto service and upon landing the second time the ignition had to be thoroughly overhauled. To do this job all the cowling had to come off. The increased wind stiffened our fingers and the oil in the engine. Eielson—unknown to me—worked during this interval with four of his finger tips solidly frozen. He was to suffer permanent injury from this later on. When we finally reached Barrow the first and second phalanges of the fifth finger on the right hand were amputated.

After an hour's rapid and painful work, it took many turns to start the motor, but once started it emitted a steady roar that gladdened our hearts. A very light snow had been falling and as we taxied into the wind the freshly drifted snow made the surface sticky and the first attempt to get off failed. The second time, following our tracks gave us greater speed and we loosened from the ice a few feet from the end of the flat surface.

The navigator's cockpit was strewn with sundries hurriedly dragged from their places during the repairs. It was a few minutes before the floor could be cleared and observations taken.

The time was then 2:20 P.M. We had been out eight hours and at cruising speed our gas should last another eight hours. Uncertain ground observation from 2,000 feet showed a loss of speed of fifteen miles an hour, with a correction of five degrees. Half an hour later we were in fairly clear atmosphere and it was evident the wind was increasing. We climbed steadily, seeking to get above it. The engine was speeded up to 1625 revolutions.

At 3,500 feet a good observation showed a need of twenty degrees correction for wind in order to make good on our course, and a loss of over twenty miles an hour in our speed over the ice. Ahead were a few sections of clouds. Beyond them we hoped for more favorable weather, so we forged ahead.

Now was our first opportunity to remember our hunger. We partly emptied a thermos bottle and ate some biscuits and pemmican. I noted: "The food tastes good. Everything O. K., but speed over the ice painfully slow."

Soon the weather thickened. At 6 P.M. I got another ground observation showing a side wind of about 40 miles per hour and to keep our course we must head more into it. Our machine was headed 30 degrees south of the course we were making. We crabbed our way toward Point Barrow.

By 6:15 the sun and ice were almost obscured. By 7 P.M. ground observations were no longer possible, but dark shadowy ribbons beneath showed leads and open water. I wrote: "All gas now in top tanks. We should have enough for three hours."

It was too risky to attempt a landing. By keeping on we expected to just reach the coast. Soon it was too dark for Eielson to observe both turn and bank indicator and the compass, so I leaned over the gas tank and with the aid of a guarded torchlight watched the compass, touching Eielson on either the right or the left arm to keep him on the course. Dark clouds were all about us. Far below I occasionally caught a glimpse of a band of slightly darker grey and knew we were passing over many leads.

At 8:40 P.M. we were over a dark blackish band of open water, perhaps three or four miles or more wide. As we crossed I wrote a note to Ben: "That should be the shore lead." But we passed on above the somber grey that was cut by narrow dark lines at frequent intervals.

Our position was above one of the most dangerous districts in the Arctic ice. A wrecked forced landing within one hundred miles of Barrow—under ordinary circumstances—would mean that our best chance for safety lay in a three hundred mile walk to Wrangel Island.

The engine purred smoothly. We hoped for another hour's steady running, but any time after that we might hear the snap of a misfire due to lack of gas pressure. In an hour's time we might be over the tundra or we might still be over the rough sea ice. What was best to do in either case?

Visibility ahead was nil. We had climbed to 5,000 feet. A dull glow through the clouds, like a clouded moon on a winter's night, showed where the sun was skimming beneath the far horizon. I hurriedly gauged its bearing, then wrote: "What do you think; let her go as long as she can, then drop straight down ahead?" Eielson slowly nodded his head. No word was spoken.

My watch was before me beside the compass. At 9:02 the engine cut out suddenly, as if the switch had been snapped. There was no splutter or gasp because of starved carburetor, but a sudden silence, except for the hum of the wind in the wires.

Eielson snapped the switch right and left; there was no response from the engine. We could feel the sag of the falling plane. With great coolness and skill Eielson steadied the machine, righting her to an even keel and an easy glide. His eyes were glued to the turn and bank indicator. My hands were ready to guide and keep the compass course. As we came within a few hundred feet of the ground the horizon neared and we could dimly see it serrated with ice ridges, but they gave us no idea of the height or distance.

Near the ground the air was rough. The plane swerved and pitched, but Eielson—still calm and cool—corrected with controls each unsteady move. In a moment we were in the snowdrift. We could not see beyond the windows of the plane. I felt Eielson brace himself against the empty gas tank; I leaned with my back against the partition wall of the cabin and waited. The left wing and the skis struck simultaneously. We bounced and alighted as smoothly as if on the best prepared landing field. I gripped Eielson's shoulder and slipped through the door of the machine to the ice. Wind and driving snow filled my eyes. Dimly about us I saw pressure ridges as high as the machine. We had, undoubtedly, struck one as we came down. Along the extreme edge of the lower wing the fabric was torn. The machine still rested on the skis, but they had turned on their sides, the stanchions twisted and broken.

It was too dark to see well and the snowdrift too thick for close examination of our machine or position. We climbed back into the cabin. Few words were exchanged. Courses, wind and speed were briefly discussed; position estimated.

I had little faith in the wireless machine as the antenna current meter failed to register. But we repeated the short-clipped message: "Went out 550 miles. Engine trouble. Forced landing three hours. Sounded 5,000 meters. Landed out of gas sixty-five miles N. W. Barrow." Later I inserted the code in the automatic device and sent the letters "K. O.," meaning "Engine trouble" and turned for a few minutes, with the forlorn hope that our message might be received.

The intense strain of the past two hours of flying over the Arctic Ocean through the blizzard after sunset had left us weak and tired. Eielson stretched out in a sleeping bag on top of the empty gas tank and I huddled in a corner of the cabin and we slept.

CHAPTER V

THE STRUGGLE OVER THE ICE

ON the morning of March thirtieth—following the day the DN 1 made a 550 mile flight over the ice and landed out of gas in the dark, among rough, ridged pack-ice in a forty mile gale—the weather was thick and stormy. We could see through the windows of the cabin, where we had slept, that conditions made outdoor activity most inadvisable if not impossible.

With the uncertainty of wireless communication, we had resigned ourselves to the fate of walking to some coast.

The district in which we had landed was one in which many ships and men had been caught in the ice and none except those strongly built and well provisioned had escaped. All previous parties had been lost in the Autumn and drifting west had either disappeared or come ashore on the islands off the Siberian coast. We knew that the heavy gale from the N. E. must have driven the ice off shore, and that the roaring blizzard from the S. W. that immediately followed was likely to have great influence on the ice off Point Barrow.

I climbed from the machine and even in the thick, drifting snow could see that our safe landing the night before was miraculous. We were on a patch of smooth ice less than thirty by fifteen yards in extent. On three sides were high, rough ridges. On our right was a ridge three feet high, but beyond that was a patch of smooth ice on which a skilful pilot might land with a small machine in most favorable weather conditions.

I took the ice pick and dug a hole through ice six feet thick, and by dropping a short line found that we were drifting north of east at a speed of five or six miles an hour. The wind was then blowing at more than thirty miles an hour.

Late that afternoon a position from two indifferent observations placed us approximately at Lat. 72° 30′; Long. 155°. There was a possible chance that if the wireless messages were received we might expect help from the DN 2. We repeatedly wirelessed a message: "Now about one hundred miles northeast of Barrow. Position tomorrow." We could not set out afoot until the weather cleared.

By draining our five gas tanks we collected a little more than half a gallon of gasoline. Fuel was our greatest concern. We had ten pounds of biscuit; twenty pounds of chocolate; five pounds of Army emergency ration; and about three pounds of mixed biscuit, chocolate and pemmican packed for consumption in flight. I had thrown fifteen pounds of condensed food from the plane just before starting. I was certain of getting both food and fuel on the ice if necessary, but to live off the ice takes much time and patience.

In order to save gasoline we improvised an oil burner with a gallon can and in this we burned Pennzoil engine lubricating oil, using two slats of wood from the cabin roof as wicks. The biscuits, pemmican and chocolate were eaten cold.

All that night and the next day the wind continued. We selected from our gear what we required for walking ashore and made improvised sleds—one from the lower part of the cowling and the other from the tail-ski—to which was attached a section of corrugated duralumin from the cabin wall.

I stripped the wire from the radio antenna, except the thirty feet we were using, and with the spare wire, sealing lines and cord made a length of eighty-seven fathoms. We used these scraps of equipment rather than dig down into our gear for the regular sounding apparatus, but we could not reach bottom through the hole in the ice. (A sounding in this locality was desired only as a check on our navigation. A shallow sounding would have proved my astronomical observations and dead reckoning to be wrong.)

About 6 P.M. it calmed slightly, then blew from the north increasing to thirty miles per hour by 9 P.M.

We woke on Friday, April first, to hear the hum of the wind through the wires on the machine. The machine itself rocked and shook under the pressure. The wind direction was slightly north of west; force over forty miles per hour. Snowdrifts were piling up about us and over the sleds we had made.

By night the wind veered to S. W. Next morning, April second, a bright sun shone on a light breeze and low fine snowdrift. Our sleds were snowed under and big drifts had formed about the plane.

We freed the sleds and packed everything in readiness for the tramp ashore. The amazingly fortunate drift had carried us far to the east. From sights of the sun obtained, I calculated that we were then on about the 150th meridian and eighty odd miles from land. I decided to head south for the trading post at Beechey Point.

On Sunday, April third, we were on the trail by 8:15. A sharp wind blew from the north by west and it nipped our tender-skinned cheeks, chins and noses. Hard, dry snow was dribbling over the ridges and pack ice and by 1 P.M. it was drifting as high as our waists. Five hours of steady, hard pulling was enough for the first day out, so we stopped at a suitable place and Eielson helped build the first snow-house he had seen. It was twelve years since I had built a house of snow, but the principle is easy to grasp and the execution not difficult.

It was that night I first realized how seriously Eielson's hand was frozen. He could not hold a knife or saw and was scarcely able to carry the snow blocks. Four fingers on the right hand were badly nipped; the little finger and the one next it badly blistered and blackened. Three fingers on the left hand were affected. There was no immediate danger, but he must have suffered excruciating pain which he bore heroically without a murmur. He was agreeably surprised at the comfort our frozen house afforded. One lacking experience can never realize how comfortable and warm, even without fuel, a snowhouse can be. It was necessary to limit the use of fuel to melting ice only. As soon as the water was warm the Primus stove was put out.

Within my experience it had never been possible to get anyone to at once contentedly discard all his civilized clothing and adopt the native style of dress. I did not ask Eielson to do this until after two days' slight inconvenience—experienced because of his expensive riding breeches, woolen underwear and elaborate sheepskin jacket. Suitable clothing was on the sled. On the third day all our civilized clothing was thrown away and, dressed native fashion, Eielson was warm in his praise of the convenience and comfort afforded.

With much reduced bulk on our load we could now discard one sled and, harnessed with rawhide thongs, we dragged our load over the old rounded floes and pressure ridges. About one o'clock that afternoon, a rising cloud of steam showed that we were approaching a narrow, irregular lane of open water. Almost dead ahead of us was a break in the cloud. Experience assured me that the lead was closed. It might open any minute.

We hurried along and found a section about fifty yards wide spanning a lead trending east and west, varying in width from a yard to half a mile. We paused long enough to test our drift. The floe we had been travelling on was moving east about two miles an hour. The ice bridge was rapidly crumpling, ridges piling on both sides.

Over the squirming blocks we scrambled, ran over the few yards of unbroken ice, then over another seething mass, and we were once more on the solid floe. The relative movements of the two floes seemed greater than the easterly drift of the northerly one. This was accounted for later when, through a frozen-over crack, we punched a hole and found we were drifting slowly west.

We were then in the westerly drift which I feared might take us west of Barrow, but our easterly position and nearness to shore gave us the assurance that we would undoubtedly reach the coast far east of Barrow. We might be held for days outside an open lead, but in that case the food and fuel we might get from the seals would conserve our supply of emergency ration, and it was only a matter of time before we reached the coast and help.

But there was good reason for haste. Eielson's fingers, with the exception of one, ached and pained—a good sign, for they were regaining life—but the little finger on the right hand promised trouble. I had several times performed surgical operations—and there was a serviceable surgical outfit in our kit—but I hoped to save Eielson's hand without mutilation.

For five days after leaving the plane on the ice we laboriously hauled a sled over the old pack-ice and low broken ridges. Each night we built a house of snow. Each night and morning we went through the process, strictly necessary for comfort in Arctic travel, of turning, scraping, cleaning and caring for our footwear.

During travel our clothing was comfortable and warm, but hoarfrost gathers on the inside of boots and outside socks. Constant care is necessary to prevent them from becoming a mass of ice.

The boots must be turned inside out, beaten and scraped; socks beaten, turned and rubbed, then slung about the chest and under the arms to dry. Cleaning boots and insoles is a cold-fingered job, and drying socks on one's bosom is not exactly a pleasant pastime, but care of clothing is the most essential part of the day's work during Arctic travel.

Eielson, who for the last nine years had done no harder physical work than handle the controls of an airplane, was, after a few days, getting used to downright toil.

After crossing many lanes of moving ice pinched between more solid floes, we came to ice—the character of which assured me that it was land-locked—moving off and on shore, but not far either to east or west. Two good sun observations gave us our position. We could now afford to leave all but the essentials for a rapid dash towards land.

The ice became more badly broken and crushed, with broad ridges at frequent intervals. It was no longer possible to haul a sled and keep it upright. In fact, to have taken any type of sled over some of the ridges would have meant hours of ice chopping and road making. We decided to camp, arrange our equipment on the Indian-type packs we had and back-pack our loads over the ice. By this means we saved much time and labor. We had no occasion to turn back to right an overturned sled; every step ahead was a step nearer shore.

We had hoped to walk, but much of the way was so rough—upended ice blocks surrounded with soft snow in which we sank to the waist—that it was necessary to crawl slowly ahead on hands and knees. Without our heavy packs we might have been able to have stepped from top to top of the sharp-edged, upended ice blocks, but loaded as we were we couldn't keep our balance. No pen-picture can fully describe the state of the ice we found. During the early part of the storm we had recently encountered the ice had been badly broken and later was covered with loose, soft snow. A moving picture of our floundering efforts would be considered much over-acted, but it was a stern reality to us; one overcome only by persistence and toil.

Occasionally a few moments respite would be gained in crossing a newly iced lane, but in crossing lanes there was need to exercise great caution.

On Sunday (April tenth) we came to a wide stretch of newly formed ice, still broken in places by open water upon which the ice had not yet formed. Several seals popped their heads from the water to look at us, but we had ample food in our packs and did not disturb them.

To cross the lead meant a long detour to a place where the edges of the thicker pack were close together. It was less than fifty feet across the spongy ice. A change of wind might mean a greater separation and a wait of several days on the northern side. As I studied the conditions, Eielson stepped on the ice to see if it was safe, and went in to the knees. His long waterproof boots saved him from a wetting. Careful testing showed that by skirting round a little we might safely cross. Soft snow had fallen, hiding the character of the ice. Each step must needs be tested. As quickly as possible we edged across, our feet spread wide and icepicks outstretched in case we might go through. I reached within three yards of the other side and turned to say "Come on," when the ice beneath my feet gave way. I went into the water up to my waist. Eielson was transfixed with horror. Fortunately, the ice was thicker where he stood. By throwing my weight largely on my arms and the extended icepick, the ice about held me. My feet were quickly drawn out of the water and I rolled over and over to the thicker ice.

Just near the edge I went in again, but this time I was near enough to haul myself with the icepick to the solid floe. My clothing was soaking wet, almost to the armpits. My high waterproof boots full of water. I slipped the eighty-pound pack from my shoulders and threw Eielson a line to which he fastened his pack. When it was hauled over, he spread-eagled across the young ice to safety. It was a narrow shave, brought about by necessary though dangerous haste to reach shore.

One cannot afford to rush things in the Arctic. It is a place where, to accomplish much, one must bide his time and proceed with utmost caution. The first thing I should have done after falling in the water was to roll in a deep, soft snow bank; but there was no soft snow nearby. The outside of my clothes froze almost instantly. Inside, my legs and feet were slowly stiffening. We seized our packs and hurried to some rough ice for shelter. A pair of spare boots and two pairs of socks were strapped to the top of my pack for use in such an emergency and it was not long before Eielson had pulled my boots and socks off. They stood up stiff and solid as he tossed them aside. We squeezed much of the water out of my pants and I dallied none getting into dry footgear. My fur shirts and pants would dry as well on me as elsewhere, so we bundled up our packs and proceeded over the rough ice for two hours before stopping to build our quarters for the night. The temperature was about ten degrees below zero.

We had abandoned one sleeping bag and one half of the other. At night we slept in our parkas and on our canvas packs, both of us with our feet in one bag. We found this warmer and more comfortable than an individual bag, and a safe proceeding for a limited time. But, sleeping in one's clothes is not a practice to follow on long journeys, for reasons of health and wear and tear on the clothing.

There was little sleep to be had in saturated clothing, but after another day's struggle through the soft snow my clothes were almost dry.

For several days after leaving the plane we crossed many bear and fox tracks, but in the terribly broken up ice and soft snow nearer the shore, not even the bears and foxes ventured.

However, it was the character of ice I expected to find near the shore. Ben Eielson stuck manfully to his job with much fortitude and courage. We struggled slowly on, ten steps or one step, then a tumble. Often our feet were pinched between narrowing cracks hidden in the snow; many times we had a ten minutes' crawl on hands and knees over ridges too steep for even a dog to follow; then a cautious slithering dash across young ice that sagged as would a stretched blanket, if you stepped on it.

On Thursday (April fourteenth) we had to make a long detour to get around some young ice that was too thin to walk on. Towards evening we came to a pressure ridge higher than any we had seen before. Eielson looked at it with misgiving, but my heart was glad, for I recognized it as the edge of the shore ice: there would be no more rough ice to cross. That night we camped near an old hummock and built our last snow-house on the ice. The next night we would camp on the beach or—if luck was with us and my navigation nearly correct—we would sleep in a wooden house of some kind.

CHAPTER VI

SANCTUARY

FOR two days the weather had been warm and hazy, but that night it grew cold and clear. In the morning, from the top of the hummock, we could see far to the south an unbroken expanse of white—the shore ice and possibly the flat tundra beyond.

At 7 A. M. we shouldered our packs and trudged eagerly onward, resting for a few minutes every half hour. There was no more tumbling or crawling; no more young ice to cross. It was now not a question of danger, but one of endurance.

We had not apportioned or rationed our food. Each one ate as much or as little as he cared. We had taken with us thirty-eight pounds of biscuits and chocolate and half a gallon of fuel. We had five pounds of food and a little more than a quarter of a gallon of fuel left. This showed an average consumption of less than sixteen ounces of dried food per man per day.

A few minutes before ten o'clock my eye caught the wavering line of a distant pole on an island near the shore. At ten we rested and through our Mirakel five-power field glasses we could plainly see two poles and timber on the sandpit. A few degrees to the right of the course we had followed for thirteen days, a dark object looked suspiciously like the roof of a trader's house. We made for the island to take another look. We had not gone three hundred yards when we struck a dog trail heading west. It was leading toward the dark object we had observed. Another look with the glasses and we could plainly see the house and the store room attached. It was the trading post at Beechey Point. I did not recognize it, for it had not been there when I passed that way thirteen years before.

Hard physical work, danger, uncertainty and anxiety had stilled our tongues during the march shoreward. A little ruminating now and then; short discussions as to the accuracy of navigation; solicitous inquiry as to tender parts and condition after strains and falls, that brought uncontrollable sharp cries of pain from one or the other as we tumbled or pinched our feet and ankles between the steel-like ice, was the extent of our conversation.

Absolute, sympathetic companionship I had found in Eielson, who had shown under conditions of the most trying nature, the courage and competence that good breeding, careful upbringing and education produce.

In sight of relief and human habitation, our tongues began to wag. Whom might we find? What had our friends thought of our delay? Had our wireless messages been received? Would we find transportation at the house, or would we have to walk to Point Barrow? Those and many other questions.

We proceeded leisurely towards the house, resting frequently. We came within two miles before a sign of life was seen, then a figure rose from an Eskimo house near the trading post and quickly disappeared. Soon a dog team was scurrying in our direction; then another approached from the trader's store. With it was Alfred Hopson, son of our old friend, Fred Hopson at Barrow, who had been my travelling companion when I was in the Arctic with Stefansson.

By twelve noon, we were inside the trader's house at Beechey Point, where Anton Edwardson, representing H. Liebes & Co. of San Francisco, showed us every hospitality. He had returned from Barrow the day before and from him we learned that our friends had not been idle.

After consultation with Mr. A. M. Smith—the worthy correspondent of the *Detroit News*—we learned that Alger Graham, pilot of the DN 2, had proved his ability as an Arctic air traveller. Accompanied by an Eskimo, Ned Nusungena, he had traversed the coast for several hundred miles in both directions and looked out over the ice with the hope of rendering us aid. Looking after his own machine and engine, he had performed wonders.

Mr. Smith, with great thoroughness and care, had done everything possible to place help in our way, both on the ice and along the shore. Howard Mason, who last year so ably proved his worth, again distinguished himself by listening tirelessly for our calls and had actually picked up one or two scarcely audible signals that enabled our friends to learn that we were down on the ice and making our way to shore. Hemrick and Porter, at Fairbanks, had done all in their power to help.

We were more tired and worn from the trip than we at first realized, and when my friend Takpuk, an Eskimo, volunteered to race to Barrow with his dog team and ask Graham to call for us with the DN 2, I readily agreed. Unburdened, Takpuk and his dogs would reach Barrow in a few days. An extra man along would have meant delay. Carrying a hastily written letter, Takpuk left Beechey Point less than three hours after our arrival.

After Takpuk had left, Eielson and I sat down to the first hot meal we had had in eighteen days.

Under treatment, each of Eielson's fingers, except the little one on the right hand, grew better. The sudden cessation of strenuous action seriously affected the muscles of my legs and feet. For five days after our arrival my feet and legs continued to swell. I was scarcely able to hobble from the couch to the table, but treated with liniment from a neighboring camp I began to recover, and by Friday—just a week after we had landed—when Graham called for us with the DN 2, I was almost normal again.

Graham had been to Fairbanks for supplies and called for us on his way back to Barrow. We loaded our limited equipment into the plane and flew to Barrow. Reaching there, Dr. Newhall confirmed my suspicions. Eielson's finger was in a serious condition, but not yet dangerous to his general health. To avoid complication it was necessary to amputate two joints from the little finger—and one of the best travelling companions I have ever had will carry as long as he lives, a constant reminder of eighteen strenuous days.

During this time we had helped to prove three things: (1) the approximate limit of the Continental Shelf north of Siberia; (2) that landings and forced landings on the Arctic pack-ice are possible; (3) that it is possible for experienced men, without dog teams, to walk to safety over the Arctic pack-ice.

And in addition, we had proved the ability of the healthy-bodied, healthy-minded man to rise to all emergencies.

Our safe arrival at Barrow was a great relief to our friends, both Eskimo and American. In the eyes of the Eskimo we had done the supernatural. Our American friends knew that we were glad to be able to continue our program.

I considered the sounding we had made in Lat. 77° 45′ Long. 175° West all that was necessary for us to do in that direction from Barrow. There was, and still is, a possibility of finding a few islands north of Wrangel Island. But information as to that area, now that we know the edge of the Continental Shelf to be not far north of the Siberian Coast, was of less importance than a knowledge of conditions far to the northeast of Point Barrow.

The DN 2, although a fine machine, was inclined to be tail-heavy and became more so in spite of all we could do by careful loading of the cabin. With a heavy load this feature tended to reduce our flying speed. Careful calculation showed that while in calm air we might just reach Etah in a flight over the ice to the north of Grant Land and then south, we could not expect to make it against a head wind and it was likely that we would meet such a wind on that journey.

I had planned to use the Fokker machine for the northeasterly flight and when the three propellers available at Fairbanks had proved unsuitable, an order was placed with the Hamilton Aero Manufacturing Company for another.

Upon our return from the ice trip on April twenty-second, we learned that the new propeller was not expected to reach Fairbanks until May tenth. Orval Porter at Fairbanks had thoroughly overhauled the Fokker machine and engine and except for the new propeller it was ready for flight. Since the propeller would not be available until May tenth there was no need to hurry back to Fairbanks.

I considered the advisability of going for a short trip with the DN 2, directly north of Barrow; and whether to go out in an attempt to recover the DN 1.

There were two main arguments against both these trips. They involved, while attempting something of secondary importance, the risk of a forced landing and the end of work for that year. Also, that plan would involve a considerable expenditure on the part of the *Detroit News* in order to maintain and return the three men—Smith, Eielson and Mason—who would thereby be compelled to remain at Barrow until late summer and return by boat.

By delaying until the Fokker was ready, I could return Eielson to civilization where his finger would more quickly heal. I would have a machine with which we could expect to make a safe, non-stop journey to Etah, or return to Barrow if we found land. And, in the event of us not returning to Barrow, Eielson—whose finger would by that time enable him to return to work—would be able to fly the DN 2 and return to Fairbanks and the States with Smith and Mason.

There was now no certainty that we would find the DN 1 if we went to look for it. It might by this time be crushed by the ice or have drifted to some distant point. I considered short trips, involving equal risks for less important results inadvisable when we might with a delay of a few days make a long eastward journey and complete the major part of our program.

Having decided to return to Fairbanks for the Fokker before setting out over the ice, there was no hurry to leave Barrow. We would wait until Eielson's finger was less likely to give trouble in the event of a forced landing on our trip to Fairbanks. It would not have been wise to lose sight of the fact that a forced landing half way on the direct course from Barrow to Fairbanks might mean a tramp of five or six hundred miles and several months' delay. Because of this, we intended when we did leave Barrow to follow the coast route via Wainwright and Kotzebue.

With Graham piloting the DN 2, fitted with wheels, and Eielson and I as passengers, we took off over the snow at Barrow and set out for Fairbanks. We followed the coast closely and had scarcely passed Wainwright Inlet when one cylinder of the engine started to miss. It was one visible from the cockpit and we could see that the small copper tube from the air-starter to the combustion chamber had broken, near where it entered the cylinder. The machine would just barely maintain height in that condition. Having yet some seven-hundred and fifty miles to go, we thought best to land and fix it, but before we could land at Dick Hall's trading station near Wainwright the whole inlet plug was blown out of the engine. Although the machine was losing height rapidly, Graham made a fine landing on the lagoon surface near the trading station.

We found upon examination that the broken starter tube had been severely strained after installation by bracing it tightly to an intake manifold. Once broken, it had sprung apart fully three inches. The hurried installation of the Heywood starter under most miserable conditions, undoubtedly brought about this careless workmanship. The trouble was not in any way connected with the starter mechanism.

We had some spare parts in the machine but to completely obviate the possibility of further trouble, we would have to send back to Barrow for a new cylinder and some new fittings, so an

Eskimo with his dog team was dispatched at once.

Eielson stayed at the Wainwright schoolhouse where Miss Bannon, in charge of the Presbyterian Mission, attended his finger. Graham and I lived comfortably in the quarters that Amundsen had built for himself when he was at Wainwright Inlet with his Junker plane on an attempt to fly out over the Arctic ice. Amundsen planned to fly to Spitsbergen, but his machine had smashed during the first trial flight. Its broken parts lay somewhere beneath the snow in front of the cabin.

In three days the Eskimo returned with a new cylinder and spare parts and a pair of skis which Smith sent because much light snow had fallen since we left Point Barrow. The new cylinder was installed and the skis fitted in place of the wheels we had been using and we were ready to leave. But from then, we were to have trouble with the weather.

Twice we started out for Fairbanks but the fog was too high and too thick for us to proceed with safety and we returned to Wainwright. On Friday, the thirteenth of May, although there was still much fog and low clouds, we determined to push on. After flying by compass for four hundred miles at 6,000 feet, over mountains covered with thick fog and cloud, we reached Kotzebue when a break in the clouds enabled us to locate the village. In a few minutes we had landed and decided to remain for the night. We refilled our gas tanks and changed our skis back to wheels, because at Fairbanks there was no snow on the ground.

Next morning, May fourteenth, we flew on to Fairbanks, meeting some extremely bad weather as we followed the Yukon south of the Arctic circle.

By this time the new Hamilton propeller had arrived. As the makers claimed it to be superior to and of greater pitch than the other, we were dismayed when Porter, the mechanic, told us that our Liberty engine would turn it about 1,700 revolutions on the ground, or almost as fast as the others. This meant that, in the air, our Liberty engine and the propeller would, in order to give us a reasonable speed, turn so fast that our fuel consumption would be considerably increased.

It was doubtful if the Fokker, in that condition, would give us much more range than the Stinson. But it was worth trying. Eielson gave Graham several hours dual control in the big Fokker monoplane, then, with Graham piloting the machine, carrying me and a medium load, we started for Barrow.

Graham in many respects was a fine man and a capable mechanic and pilot but he was not at home with the big, high-winged Fokker. With the little experience he had he could not accommodate himself to the monoplane after flying the Stinson biplane. There is no doubt that he would have been competent after a few trial flights, but we had no time for this and after he had repeatedly expressed his dissatisfaction with the plane and a fear to set out over the ice with the machine, I decided to return with the Fokker to Fairbanks and use the Stinson machine for the ice trips.

Graham, at this time, began to lose his enthusiasm for the flight over the ice. We transferred our load from the Fokker machine to the Stinson, but were held at Fairbanks for several days because of unsettled weather over the Endicott Range. When the weather cleared we barely missed one or two accidents by failing to take off at the end of the runway. The machine was not heavily loaded and I was certain that skillfully handled it would be able to leave the ground. Graham, however, was not anxious to leave.

We were again delayed because of the weather and some more unsuccessful attempts to take off. At last I found it necessary to give Graham definite orders as to handling the machine and governed the controls to make sure that we took the air. We left Fairbanks soon after one o'clock in the morning and once in the air crossed the Endicott Range and finding the tundra north of the range clear of fog, we directed our flight along a branch of the Colville River and along a river uncharted, except for its mouth at the Arctic Sea. By checking our speed to gauge distance and sketching in many details we were able to add a great many geographical features to the map of that section of the Arctic. Although we found the village of Barrow was covered with fog, we descended low to the ground and following the coast landed the machine on the lagoon without difficulty.

From Fairbanks to Barrow we had carried a pair of Severski skis on the wing of the plane rather than spend a day going back to Kotzebue to pick up the pair we had left at that place.

CHAPTER VII

ANTI-CLIMAX

THE season at Barrow had advanced rapidly and by the time we returned the lagoon surface was soft, slushy snow. We landed with wheels without trouble. It took but a few hours to prepare the DN 2 for a flight over the ice. The skis were fitted and twenty-five five gallon cans of gasoline were distributed in the cabin. The extra load of cans hemmed in both the pilot and myself so closely there was scarcely room to move. It was a dangerous arrangement and involved a risk that neither of us was eager to take. But the work was ahead of us and after careful consideration we resolved to chance it.

Graham's contract called only for flights over land. He was engaged with the definite and clear understanding that he could refuse to go on any flight over the ice and his consent to go on the trip to Greenland was not enthusiastic.

ANTI-CLIMAX

Thick fog delayed us for several days, then during a spell of clear weather at Barrow, we climbed into the machine and took off from the lagoon ice that, by this time, was almost entirely covered with several inches of water. My plan was to go out toward Grant Land, determining the absolute course by conditions observed. Our object was to reach some part of Grant Land if we did not discover land before we got there. If we saw land within six hundred miles of Barrow—which we considered unlikely—we would then return. If not, we would descend, take soundings and continue on, landing when out of gas and proceeding on foot to Etah, Greenland, or some post of the Canadian Northwest Mounted Police.

We had risen from the water-covered ice with difficulty and struggled for a few minutes to get altitude. Our well laden machine was tail-heavy and it would have been dangerous to attempt a turn immediately so we followed the coast for some distance in order to check our compasses. The storage of gas cans in the cabin had played havoc with our compass deviation but after forty-five minutes on various courses I got some idea of the necessary correction. We wanted to lower our fuel consumption as far as possible and with the engine at 1,430 revolutions our air speed was seventy-eight miles per hour.

We took up our course over the ice and for thirty minutes after leaving the coast we covered ice that was terribly broken and scattered. A ship might have passed through it with ease. It did not offer one place on which the plane might have been even crashed and a forced landing would have meant death by exposure or drowning. The engine stuttered once or twice, just enough to make us apprehensive, but eventually steadied down to an even purr.

We had gradually climbed to 2,000 feet. Ahead was a blanket of fog, low on the ice. We could scarcely climb high enough to get over it. In the distance we could see another layer of cloud with the fog beneath. At times we skimmed through the fog bank. Soon we were between two layers of cloud; it was impossible to learn anything of the conditions beneath the fog or navigate with any degree of accuracy. Graham was casting anxious glances but kept steadfastly at his job. I realized the futility of proceeding and after flying for more than two hundred miles over the fog, we turned back toward the coast. I discussed the advisability of this move with Graham and he agreed to set out with me again on some future occasion.

After emptying the gas from several cans into the main tank we discovered that although I took care to replace the same can in the same place, the distribution of gas deflected the small Pioneer compass that was near the can, while it did not alter the compass forward of the cabin.

Thinking that the coast would still be clear of fog I decided to head in the direction of Beechey Point and there deposit some gasoline before returning to Barrow. We might, if we went out again, or in an attempt to return, reach the coast out of gas somewhere in that neighborhood. Since we had an ample supply of gas at Barrow it would be an advantage to have a supply also at Beechey Point.

We found the conditions on the coast near Beechey Point very hazy and dull but not fog covered. We had recognized the point of the coast we first reached and in a few minutes had landed at the trader's house near Beechey Point. There we depoted sixty-five gallons of gas and after having a meal, set out for Barrow. Meanwhile, the fog had rolled in from the Arctic Sea. We flew over it until we estimated our position to be near Barrow village, then we descended cautiously until within a few feet of the ground and after circling for about twenty minutes, located ourselves on the coast and followed the shore line to the landing field on the lagoon at Barrow.

In the air, flying at ninety miles per hour, we could not accurately estimate the distance we could see through the fog. At the village, we discovered that we could not see the three hundred yards' distance between the houses separated by the lagoon. We were glad to come to rest safely. Even over the Arctic sea-ice and tundra, where we knew of few obstacles exceeding a height of fifty feet, flying low through thick fog is—until experience is gained and confidence in the machine established—a trying experience.

For several days the fog continued too thick to enable us to take off from Barrow. The season for safe and valuable work was undoubtedly over but I was very reluctant to postpone our attempt and had not made up my mind to abandon all hope for the season, when Graham came to me and said he was unwilling to take any further risks over the ice that year. I think perhaps his decision was wise and although it disappointed me at the time, I had much misgiving as to the advisability of taking Graham along on an ice trip. I had learned that he had trouble with his feet that would probably be serious in the event of having to walk to shore. Neither constitutionally nor mentally was he a suitable pilot for a flight over the ice, but he had proved himself a capable pilot and mechanic and most willing worker on jobs within the scope of his experience. He was not bound to undertake a flight over the Arctic Sea; but, he had voluntarily done so in search of Eielson and myself when we were out on the ice and he stayed with the job on our flight over the fog. For these things and many others, he deserves much credit.

Since he now refused to go out again, I considered the advisability of going alone. There were reasons why this was an entertainable idea: By going alone I could reduce weight of the equipment and food; I could carry more gas, probably sufficient to actually reach Etah, in the machine and I could—even alone—with the Sonic gear take a sounding if a landing on the ice was made. If I were forced down, I could walk out alone with less difficulty than with a crippled companion. I could also more cheerfully face greater risks when none other than my own life was at stake.

Two considerations mainly helped me to decide against this plan: The first was that to leave Smith, Mason and Graham at Barrow would mean a trip alone for Eielson to get them, if indeed, that would have been possible. The ice conditions at Barrow were no longer suitable for landing with the Fokker machine fitted with wheels and it is doubtful if a safe landing could be made on the beach in summer. It would have most probably meant that the men would have to remain in Barrow until late in the summer and return by boat, and each of them by this time was anxious to leave Point Barrow.

There was also the ever present possibility of a lone traveller's word being doubted by some individuals and societies and any observations taken on a lone flight might prove valueless. Then I had had little recent experience with actually taking off and landing with a machine and none with an overloaded machine. Considering everything the risk involved, starting out alone immediately was not worth while. It seemed best that all four of us would go back to Fairbanks in the DN 2. We would then store the Stinson, dismantle and ship the two Fokker machines to Seattle, return the men to the place of hire and discharge them—thereby keeping faith with the promise made the *Detroit News* that the expedition would not last much later than June. If circumstances made it seem advisable I could return with floats for the Stinson machine and make further flights in the summer or postpone all further attempts until late in the fall.

By June fifth we had packed and stored our supplies at Point Barrow. Spring had made such rapid strides that the lagoon ice was covered with from seven to ten inches of water and the ice might break up any day. It was dangerous to attempt a take-off with a heavy load and there were four of us to return in the Stinson: Graham, Smith, Mason and myself constituted a load almost equivalent to one for an ice trip.

We rose from the water-covered ice after several ineffectual attempts and slowly made altitude. Graham climbed the machine skillfully but several times, in spite of his efforts, we went into a stall and it was only the extraordinary stability of the plane that saved us from a disastrous accident. It was overcast, but I believed it would clear a few miles inland and over the Endicott Range. At 2,000 feet we came through the fog and headed for the Anuktovik Pass on a direct course for Fairbanks.

After crossing the Endicotts we faced bad weather conditions. Low, black clouds and rain barred the way.

Mason and myself poured gasoline from the extra cans to the tank and again I noticed that the removal of gas changed the compass deviation. While filling the gas tank I had lost our position, which had been maintained until that time by piloting; i. e., following signs on the ground. As we had recently changed courses abruptly, flown through thick rain and cloud and changed altitude considerably, we were not quite sure of our location when we came to the Yukon River. We followed the river until we oriented ourselves, then found that we had to retrace our flight in order to reach Fairbanks. We had detoured to avoid the clouds and rain more than one hundred and fifty miles and because of variable head winds had taken much longer than we expected.

There was no way of gauging the fuel supply of the DN 2 and we experienced much anxiety over the possibility that our gas might fail before we reached the landing field. Graham handled the machine to best conserve the gas and with skillful piloting landed us with skis on the gravelly surface of the Fairbanks field after a flight of seven and a half hours.

ANTI-CLIMAX

Our exploration for the season had ended.

In three days we had dismantled and shipped the Fokker machines and stored the Stinson at Fairbanks and were on our way back home.

All members of the Expedition arrived at Seattle June 18, 1927. The men were paid off and returned to their homes and the Arctic plans postponed until something could be done with the Fokker equipment.

PART III

FULFILLMENT

CHAPTER I

A DREAM BEGINS TO MATERIALIZE

UPON my return from the attempt in the summer of 1927 to penetrate the fog-ridden Arctic Sea there was not a word from my early supporters. Apparently they were of the opinion that the incident was closed. On the way to Seattle I received a telegram from the *Detroit News* saying they were no longer concerned in my work and asking me to close the Expedition without more expense to them. They most generously agreed to pay all the outstanding bills incurred that season and gave me the machine they had loaned to the Expedition. The *Detroit News* had shown a wonderful spirit of generosity throughout the whole of my association with Detroit, but the last message evidently meant that their interest had waned.

I accepted their machine and gave them the assurance that either the machine or its value would be used to continue the work in the Arctic.

On arrival at Seattle the Chamber of Commerce as usual invited us to be their guests at their Friday luncheon and the Engineers' Club asked us to speak on Alaskan conditions. No one seemed to consider it possible for me to continue, but I was determined to complete the program and surprised that others did not realize this. Perhaps a few did; some of them came to my aid.

If I were to continue with the work, it would be necessary to clear up all the odds and ends of equipment and get rid of the surplus gear. We still had the one Stinson-Detroiter at Fairbanks and if I could have straightened out the matter of finances with the Detroit Aviation Society, I would have felt free to go back alone with the Stinson and take the chance of reaching Grant Land and having to walk back from the north end of that island to some point of civilization.

There was no profit to be made from the last Expedition and except for the sale of the planes there would be no money forthcoming. It was doubtful if the price the planes would bring would show a profit over expenditure. It had cost a great deal to ship them back to Seattle and was costing more and more each week for their storage. The two remnants of our Fokker planes were worth, no doubt, at least thirty thousand dollars, but it was unlikely I could sell them for even half that amount. There was a possibility that some one anxious to enter for the Dole Flight from San Francisco to Honolulu might buy them, but I found that the majority of men wishing to enter that race were without independent means and also without the ability to raise fifteen thousand dollars for a machine and a similar amount for engines—a necessary feature if they were to use our biggest Fokker.

I journeyed to San Francisco with the hope of effecting a sale, but there seemed little prospect and I decided to continue on to Los Angeles. On the morning of the day I intended to start South, I sat in the window of my hotel room, devoutly wishing the machines were sold, and determined that if I could not dispose of them readily I would start North at once and attempt the trip across the ice in the old Stinson-Detroiter. Flying alone, I might reach Etah. Such a plan was not at all impossible and there was no doubt that I could, under favorable weather conditions, both pilot the machine and navigate with sufficient accuracy to reach some part of the Grant Land coast; fix my position accurately, and if there was enough gas left, start off for a Canadian Northwest Mounted Police Station at Bache Peninsula opposite Etah.

I knew that Grant Land is a hunter's paradise and if the machine were crashed in landing I could easily walk the rest of the distance. To be sure it might take considerable time, but time is of no great concern after the work has been done and the trip from Barrow to Grant Land was the most important step of the work. In case of a forced landing far out on the ice—requiring a long walk to shore—I believed I would be better off alone. To live by hunting on the sea ice would make it necessary to take a zigzag course, following the tracks of polar bears and foxes at right angles to or away from the direct course,—wandering for weeks and weeks and for many miles, edging nearer the shore when possible but not hurrying to get there. I knew of no other pilot who would be content to follow such methods. Any one of them would be anxious to hasten shoreward and might be led into trouble.

My experience in polar travel and hunting had already inured me to the annoyances, inconveniences and hard work entailed by such a trip, but there were few men, and none was available, whom I knew to have had the training needed to develop that type of mental attitude.

It is an easy matter to encourage a companion strange to the conditions and jolly him along while the two of you are together. But, when one must deviate from the course in search of game it is not so simple for the inexperienced or weaker man to go ahead with the assurance that he will be overtaken, and he might never be should the ice break and open between the men during the day. If it is not possible to carry enough food for the total length of the journey I would, all things considered, prefer to travel the Arctic pack alone. The anxiety of a leader, facing the possibility of directing his well-liked companions toward danger, is a far greater hardship to him than facing alone the hardest possible physical effort.

I had firmly fixed in my mind the plan of flying alone when across my distant vision flashed the most efficient-looking monoplane I have ever seen. It was a fleeting glimpse, but I saw instantly and at a distance its distinctiveness. The machine was broadside to me. I marked its beauty of streamline, angle of incidence, and attack of the wing in level flight. The speed and the angle gave me a first impression that the machine was descending from a height, but its constant position above the horizon soon showed it to be flying level. As it turned towards me I realized the full beauty of its design. It apparently offered no head resistance except for the engine, leading edge and a slim landing gear. It had no flying wires; no controls exposed—nothing but a flying wing.

To one who had been dreaming development of airplanes for eighteen years, the sight of this machine was the materialization of a vision. It gave me the thrill that another might experience if he saw his ideal woman in the flesh. Conscious of a deep satisfaction, I said to myself—if that machine checks up in aerodynamic qualities anything like it looks, I am going to have one like it for my work. I sensed unmistakably in my own mind that the transient glimpse of that machine was the beginning of the road to success.

I telephoned the various flying fields in an endeavor to locate the machine, but none recognized it from my description, which was probably vague and fantastic. I was disappointed, but determined to find it.

From that time on things began to shape themselves for my convenience, though the way has not been all smooth. I proposed to my friend, Ray Shreck, that we should call in at one or two flying fields on our way South to Los Angeles and at the Oakland Airport—where preparations were going forward for the Dole Flight—I first saw the *Lockheed Vega* monoplane on the ground. I was a trifle disappointed. From my layman's point of view the tail surfaces were too low behind the wing for perfect flying qualities; it was a blemish on the face of my beautiful lady. I thought it might be necessary because of the design of the bullet-shaped body. The wing area looked too small to carry a load sufficient for my requirements, but general appearances cannot possibly enable one to judge with accuracy the performance of a plane.

A name painted on the rudder showed that the machine had been built in Los Angeles and learning this eased my mind, for were we not going to Los Angeles? There I could inspect the factory where it was built and gain the information I desired.

Arriving at Los Angeles, after a most pleasant motor trip, I soon sought Mr. Allan Loughead of the Lockheed Aircraft Company, and no matter what his plane might prove to be

I saw in Mr. Loughead a man of great charm and worth: I have had no occasion to alter that opinion other than to magnify his good qualities.

The machine had returned to Los Angeles and I was invited to inspect it, together with blue-prints, figures and design at the factory. In the drafting office I met Mr. Jack Northrup, the principal designer. Northrup is a delicate-minded, sensitive visionary with such sound theoretical and practical training as to make him an exceptional genius.

I studied the blue-prints, scanned performance figures and saw with pleasure the evidence of thoroughly expert workmanship in the factory. Although the factory was not yet in the course of quantity production, it was a place where accuracy was followed with as much precision as in a first class pattern-maker's shop. I was somewhat dismayed to discover that the machine I had seen was the first and only one of its kind. I knew from experience that skill and efficiency alone did not eliminate the necessity for working the "bugs" out of an airplane and that my friends would soundly berate me for again using an experimental machine for my work.

Each year I had purchased the latest type available, and to my mind best machines for the work in hand, but they had been still in the experimental stage. I bought the first seventy-two foot winged, tri-engined Fokker monoplane ever made. It was criticized severely for this, yet it was in a similar machine Byrd flew the Atlantic and Hegenberger and Maitland the Pacific. The very machine I bought broke the world record by far for wing-load and almost broke the endurance record by staying in the air for nearly fifty hours.[1]

The next year I purchased a Stinson biplane; one among the first of that make. They proved then and still are, I believe, the best biplane of that size available. Stinson later designed and built a wonderful monoplane which has flown the Atlantic, broken the endurance record and created many other records, but it was a lumbering ugly duckling compared with the beautiful, slim bird-of-paradise that Loughead and Northrup had produced.

My vision of flying alone in the Fall faded. With a Lockheed plane I could afford to take

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[1] Since the MS. for this work was written Charles Kingsford-Smith and Charles Ulm used the airplane here referred to for their notable flight from California to Australia, thus vindicating Capt. Wilkins' great faith in the Fokker plane.—EDITOR'S NOTE.

Eielson along as pilot and be more certain with his help to do the job. The practical consideration of funds intruded. How was I going to convert the used machines I had into the cash necessary to provide a new plane?

I had not the slightest intention of asking for further support from Detroit and felt it would not have been forthcoming even had I cared to do so. With one or two exceptions, I could consider them friends no longer; particularly would this be true when I proposed to abandon the use of a Detroit built machine for one built on the West Coast. The Stinson, however, without doubt had proved its worth and a new Stinson monoplane would serve our purpose next year.

After much thought, loyalty to my few remaining Detroit friends prompted me to make inquiry. If the purchase of a Stinson involved no greater expense than that of a Lockheed I felt I should order a Stinson monoplane—since I had now determined to get a new machine. A telegram to the Stinson factory brought a reply from which I gathered I could not expect any consideration from them. The price of their standard machine was the same as that of the Lockheed. The Stinson Company would charge considerably over a thousand dollars for extra

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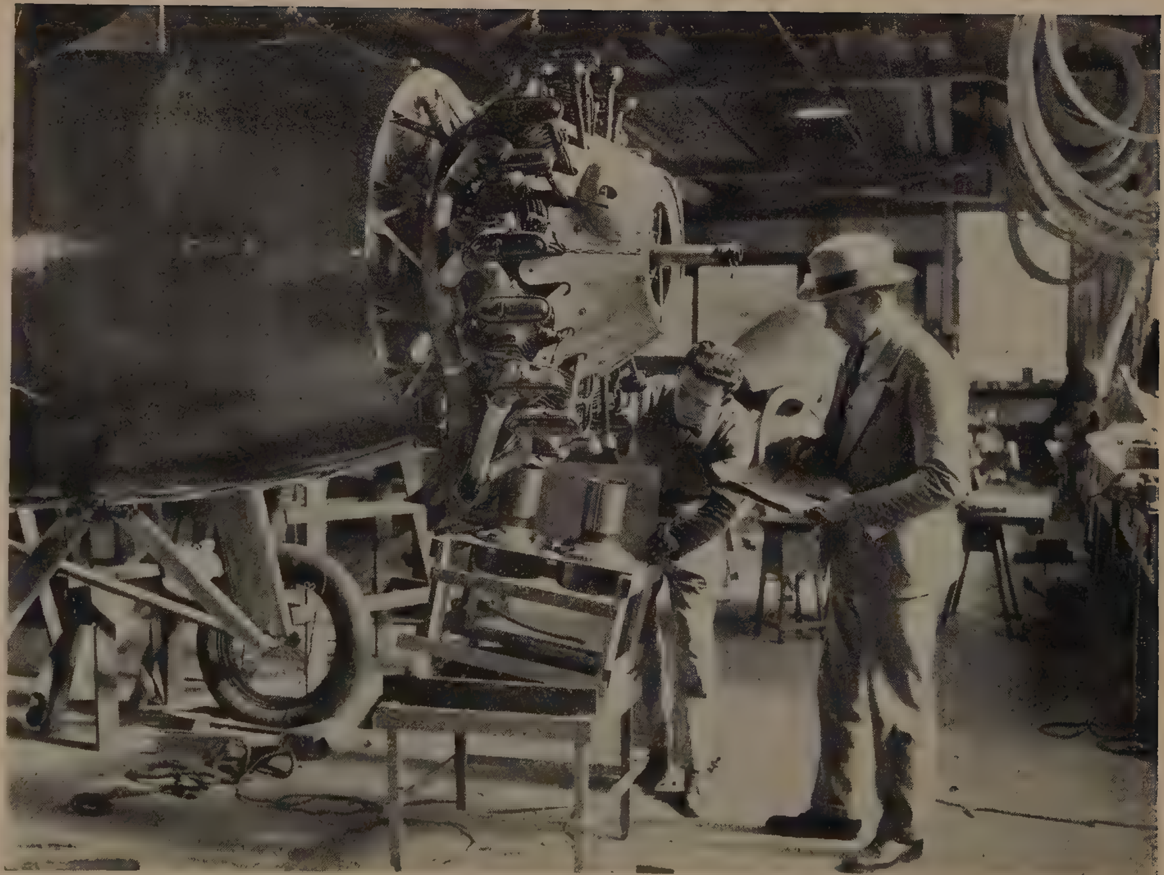
WITH HIS DETERMINATION TO BE "WORKMAN AND MECHANIC AS WELL AS NAVIGATOR" CAPTAIN WILKINS INSPECTED EVERYTHING



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A PLANE BEGINS TO MATURE

tanks and equipment and I had to consider the extra freight from Detroit to the Coast as compared to the cost of shipping from Los Angeles. The Lockheed Company was prepared to equip my machine with all necessary alterations for Arctic flying at the same price as a standard Stinson.

I believed that loyalty to my Detroit friends in this case meant that I should provide myself with the best available machine for the least expenditure. With the Lockheed there was unquestionably a better chance for success and although I doubted whether the Detroit people would see it that way at once, I felt sure of their forgiveness, in the end. As time passed and my negotiations for the Lockheed became known, I received some rather indignant letters from Detroit, but they failed to shake my faith.

CHAPTER II

NEW WINGS

I RETURNED to Seattle to try and further the sale of the old machines. Then came a time when my friend, Lura B. Shreck, found a chance for the sale of one of the machines: Three Australians wished to fly from San Francisco to Hawaii and on to Fiji and Australia. Our big machine was the only suitable one available and although the price was well beyond their means the Australians agreed to buy the machine. After many trying complications the completion of the sale was effected.

I was then able to order and pay a substantial deposit on the Lockheed. It was to be the third machine from their factory; the second machine then in process of building was to be used for "working out the bugs" and demonstration purposes. About this time Fortune smiled a little broader. The airplane companies at Fairbanks, Alaska, were hard pressed for machines and two of them were anxious to buy the Stinson I had stored there. After a short delay an equitable arrangement was made for its disposal and I then had almost sufficient funds to carry on with the expedition.

There remained on my hands the second Fokker machine; its storage costing money each week, but I had hopes that I might sell it later on—or if successful this year might keep the machine myself. For its size, I have never flown a sweeter machine. It carried us on our first trip over the Arctic pack-ice; it strained under phenomenal loads and lifted them from the wretched field at Fairbanks; carried them safely between mountain peaks of the Endicott Range; struggled with us through cloud, rain, snow, sleet and in the end when strained to absolute breaking point, had let us lightly down in its crash. To sell it or leave it will seem to me like leaving an old, tried, and trustworthy friend.

From the beginning of arrangements for this year's flight I resolved to be my own business manager, workman, laborer, mechanic, and navigator. I did not want to be hampered with the worry of accommodating a staff of mechanics, correspondents and wireless men. Notwithstanding the fact that the newspaper men and wireless staff we had with us in 1927 were most efficient at their jobs, most amiable and likable companions, their presence added to our task far more than the publicity we received could probably benefit those of us who actually had to do the work in the field. Despite the dire need of financial help from newspaper sources, their correspondents and required retinue are an added responsibility and a scarcely justifiable hindrance to the commander of a scientific expedition.

With the assurance of having a first class airplane for the work—but with the knowledge that, barring accidents, my available finances were just enough to take us through—I wrote Eielson of my intention to go North again this year and attempt a flight to Spitsbergen, offering him as in the past the first refusal of the job as pilot. To my pleasure Eielson replied that if he could get leave from the Department of Commerce, Aeronautical Division, for which he was inspector, he would be glad to go North again. He had not seen the Lockheed plane, of course, but as ever, he was willing to accept my estimate of the plane's good qualities.

There was then the somewhat superfluous task of supervising the construction of the plane. My presence was not needed to insure better than ordinary or first-class workmanship and attention to details but there were many small and minor alterations for the convenience of pilot and navigator in Arctic conditions that should be incorporated in the cockpit and cabin of the machine.

The machine was to be of the standard cabin type, powered with a Wright J-5 Whirlwind engine with two gas tanks in the cabin in place of the usual seating accommodation; two extra gas tanks would be placed in the wing; two upper windows were to be left on each side and two on each side in the floor, fashioned so as to afford good visibility and facility for taking ground speed and drift observations without the necessity of opening a trap-door and suffering the rush of cold wind that we had experienced in planes previously used. These windows were of necessity curved plate glass but I figured this would not distort vision to the extent of bringing about dangerous errors in observation.

The machine being of wood construction would eliminate many of the difficulties of navigation. Care was taken to keep all metal fittings likely to interfere with the compass away from the navigator's compartment. One window was hinged so that it might be opened if required to facilitate observations of the sun. The navigator's entrance was designed in the fashion of a hatch on a ship, serving also as an opening through which observations might be taken. The navigator would, if necessary, be able to squeeze through the opening above the gas tanks and beneath the wing and reach the cockpit, but this was an advantage not likely to be required. Communication could be established with the pilot by shouting or by passing notes on the end of a stick. The pilot's cockpit would be entirely enclosed with windows of Triplex glass, giving excellent vision in all directions and in case the windshield should become fouled with oil or snow, a small window on either side could be opened and shut with ease. (I might mention here that an improvement even on this convenient arrangement is necessary. Future machines should have double windows in front of the pilot, each opening freely so that one will shelter the pilot while the other is being cleaned.)

The instrument board in front of the pilot held besides the usual tachometer, thermometer, pressure gauge, altimeter, air-speed indicator and watch, an additional altimeter registering accurately to two feet, a turn and bank indicator, a fore and aft inclinometer, a lateral inclinometer, one fast moving and one slow moving compass.

Our experience last year showed that while the Severski metal skis were in one detail of design dangerously weak, they were well made and their graceful streamlining induced me to attempt their use again this year. Their lack of head resistance reduced our speed less, by two miles an hour, at high speed than any other type of skis used. As a precaution, we would take with us a pair of hickory skis fitted with tubular metal stanchions. These were designed in such a manner that the lower half could be attached to the bottom of the metal ski and the upper half would fit in the cabin for transportation from Fairbanks to Barrow. If the snow was deep we could use the wooden bottoms through the flight.

The only additional strengthening of the machine that I demanded was in the axles; the thickness of these was increased a sixteenth of an inch more than on the standard machine. Experiments with the demonstrating machine had proved the advisability of raising the height of the rudder and fin. This alteration removed the only doubtful aspect I had remarked when I saw the first machine. The Lockheed Vega now seemed as near perfection as could be, except for some inconvenience in getting at certain parts of the engine.

A flat tail-skid nine inches by twelve was provided to cope with the soft snow conditions in Alaska and Spitsbergen but we found it would have been an advantage had this part been larger. To the two lower and two upper tanks were fitted half inch plugs, on the bottoms of which were soldered strip-leaves that in their turn were attached to cables leading to the navigator's cabin. If need be these strips could be pulled off and the gasoline dumped before an emergency landing. A wooden, dural-shod runner was provided and made to fit the upper rear portion of the fuselage. In case of accident we could saw this section from the plane and use it as a canoe or a sled.

Came the time when the machine was ready for complete assembly. Without asking their permission, I included the words *Detroit News* in the name of the Expedition again this year. I did this because they had at the end of the 1927 efforts generously presented their machine to me and partly because this year's program was in reality but a continuation of last year's endeavor. In using the name *Detroit News,* I hoped to afford the management of the *Detroit News* some little recognition for their liberal support in 1927 and wrote them a letter absolving them from all responsibility, financially or otherwise, in connection with the efforts in 1928.

The *Detroit News* was kind enough to publish a recognition of what they termed a gracious gesture on my part; at the same time stating they accepted no responsibility whatever with this year's endeavor. In a roundabout way they hinted that they would have preferred to see greater preparation and were afraid their name might again be associated with failure. In view of experience gained, it was not likely that I should set out with less than the essentials; anything else would be additional expense, worry and trouble. I felt certain of success. *Detroit News-Wilkins Arctic Expedition* was painted in dark blue letters on each side of the deep-orange colored fuselage.

Because of the generous support, both this and on previous years, of the Richfield Oil Company and the Pennzoil Company (both of Los Angeles) it was arranged that these companies might paint their trade signs on each side of the machine. Lockheed, the manufacturer's name, was printed in letters as large as possible on the under side of one wing; the other being occupied by the license letter and number X 3903.

Proudly the machine was hauled from the factory in Hollywood to Rogers Airport where it was assembled. There was no question about who was to fly it on its first test flight. Eddy Ballandy, a pilot operating the large passenger monoplanes for the Maddox Airline plying between Los Angeles and San Diego, had flown the original Lockheed machine and the demonstrator many times. He kindly consented to test the machine for me. It was Monday, January ninth, that Ballandy first flew the ship for twenty minutes. "She's a pippin," he said, as he landed. I was thrilled with the way the machine had taken the air and well satisfied with the way she flew.

I could not wait to hear more because I was due at the Railway Station to meet Mr. Heintz of Heintz & Kaufman, radio engineers of San Francisco. Owing to the plane's design and wooden construction, we had high hopes of getting a perfect wireless installation. A shortwave set built by Heintz & Kaufman had performed wonderfully well on a plane entered for the Dole flight. Its signals had been heard practically all over the world and gave us the sad details of the fate of William P. Erwin and A. M. Eichwaldt as they tail-spinned into the Pacific Ocean and to death.

It had been a great struggle to afford the extra thousand dollars for the wireless installation. But I deemed it worthy if for no other reason that it would—if it worked—give us an opportunity to send out our information as collected en route. Then, though we crashed halfway or in the water near Spitsbergen or failed to return, our work would not have been in vain.

Mr. Heintz, himself, agreed to superintend the installation. It was first intended that an auxiliary hand driven system would be attached to the generator and remain a fixture in the wing of the plane but I hated to increase the empty weight of the machine and after careful consideration decided to purchase a small gasoline motor for driving the generator when not in flight. To tell the truth, I had small confidence in the reliability of short-wave wireless and was reluctant to allow its installation to interfere in any manner with the flying qualities of the machine.

Each year at great expense and considerable annoyance we had provided wireless equipment and each year at critical moments it had miserably failed us. This year, after having consented to take it, I spared no expense to get the most efficient and reliable apparatus available but insisted that it be placed so that it would not interfere with the performance of the plane.

I was to operate the set myself. While rank amateurs, both Eielson and myself could, if the apparatus was in order, successfully communicate by International Code. There was no reason to suppose that our wireless equipment should be any more reliable than other equipment on the plane and there was as much chance that our wireless power would fail as there was that our engine would quit. So, while I provided the small gasoline engine and a wireless receiver, I was firm in my mind that these things should be among the first parts of equipment discarded if weight had to be reduced. We would, of course, take all equipment and spares for transmitting from the air.

The wireless provided was a splendid set, light and excellently installed, interfering not at all with the working of the machine except in so far as the propeller to drive it and the aerial, permanently slung during flight, offered head resistance and drag on the plane. All day, after the first test flight, we worked on the wireless installation.

An accident happened that afternoon on Rogers Field that tended to prove, if proof were necessary, the wonderful spirit of Allan Loughead and his associates. A Government Official Pilot was to make a test flight with the Lockheed demonstrator. The machine was wheeled out and warmed up. The take-off was precarious as it was getting near dusk and the light was deceptive. In the air the machine was flown well, but in attempting a landing faulty judgment—undoubtedly due to the declining light—caused the pilot to stall the machine when it was still many feet from the ground. There was a crash and the Lockheed tilted dangerously. One side of the landing gear, a total wreck, dragged behind but the machine continued on an even keel balanced on one wheel until it lost momentum, then tipped on to one wing and swung in a sickening circle. Loughead, standing near by, had no first thought for his wrecked plane, no censure for the pilot's initial bad judgment. "Boys," he shouted, "did you see how that fellow held her up after the landing gear parted?"

It was truly a remarkable recovery the pilot had made but I am certain that most men on the spur of the moment and in Loughead's place would have felt more like cursing the pilot's mistake than praising his later exhibition of skill and nerve. But that was the spirit shown throughout my dealings with the Lockheed Company, not only by Loughead himself but by his associates as well. No serious damage was done to the machine. The bolts of the landing gear that had sheared in the shock of a terrific fall were replaced that night and the machine was ready for the air again.

CHAPTER III

SUNSHINE AFTER STORM

THE next day Eielson came to Los Angeles. I met him at the station and we spent the day inspecting the machine and the factory. As usual he was not demonstrative, merely saying, "She looks all right." That night he talked to the officer who had flown and crashed the demonstrator and was even less enthusiastic.

We talked of the trickiness of fast monoplanes, their high landing speed, etc., etc., and I was more than pleased to come to a most generous arrangement with the Lockheed Company. We would first have Eielson fly the demonstrator. We all knew Eielson as an expert pilot and I would have staked my life as safe with him in any type of machine. But accidents do sometimes happen and if anything befell our machine it might mean such delay as to prevent our carrying out the work this year.

It was a wise precaution but we need have had no fear. Eielson took the machine off carefully and landed likewise. He then took our machine in the air and put her through her paces but in coming to land he just barely missed the highly strung high-tension wires that border the Rogers Airport. We could afford to take no needless risks and were glad to take our machine to the Western Air Express Field some distance further from the city, accepting the hospitable invitation given by Major Mosely, who offered us the use of his field and hangar there. The high-tension wires were some distance from and parallel to the runway and at one end of the runway there was some level country under cultivation. At the Western Air Express Field we had a fine roomy hangar in which to store the machine and best of all, most obliging and helpful mechanics. Not that we needed their technical aid—I had resolved, after first taking over the machine, that no other than myself should touch the engine, except for a final checking up by an expert just before it was dismantled for shipment to Alaska. But it was most agreeable to work beside those obliging fellows to whom nothing was too much trouble: A call to the telephone when I was some distance away was never neglected, the use of special tools and gear when needed and always ready with a helping hand to wheel the machine into the hangar.

On our third flight there was consternation. We had been in the air for some time and came down for a practice landing. I climbed out of the machine and two friends got in. Eielson took off and had climbed to scarcely a hundred feet when the engine suddenly quit stone dead. My heart was in my mouth, but Eielson banked the ship sharply, headed into the wind and came down across the furrows of a ploughed field. We dashed to our motor cars and scorching to the end of the field, bumped over the furrows to the machine. We couldn't understand why the engine had quit so suddenly. She took again just at the point of landing and was, when we reached her, turning over smoothly.

By running the cars back and forth we made a runway for the wheels of the plane and taxied it back to the hangar. Only two things could have caused the trouble, lack of gas supply or a broken switch. The ignition system was perfect and there was gas in the tanks, but there must be some trouble in the gas system or feed lines. Next morning we drained the gas tanks and thoroughly tested the lines, soon discovering the trouble.

It was found that when the tanks were nearly empty, air would be drawn through the vent in the glass gas-gauge to the main feed line. This was unlikely to occur if the lower tanks were full or even if the upper tanks had a quantity of gas in them. But we had to off-set the one chance in a hundred. The required change restricted our control of gas supply from the lower tanks and made it essential to do more pumping, but produced a fool-proof system.

Each day after that Eielson and I drove to the field in our old, wheezy Willys-Knight car and flew the machine in test flights, making many landings and take-offs, testing length of runs and time to come to rest after touching the ground.

I watched Eielson's confidence in the machine grow and grow. At first he sensibly landed her fast and held her down in the take-off but soon he would land her at almost stalling speed and take off and climb like a bird. He became as enamored with the machine as I was. She was fast in the air and handled perfectly. It was a joy to sit and feel her bound forward in response to the opened throttle. I felt that the success of our long-distance flight was assured and it seemed to me that the job was done.

There was an odd sense of annoyance in the back of my head that it should be necessary to spend the time to go to Barrow and actually do the flight. It was like setting out to run a race after the prize was won. But this strange foreordination did not prevent me from going ahead most carefully in the arrangement of every detail.

Muroc Dry Lake was selected as the most suitable place to take the machine and carry out a series of load and speed tests. Again the Richfield Oil Company and the Pennzoil people generously came forward and made every arrangement for our convenience and comfort. The Lockheed staff drove to the Lake by car. Eielson and I flew the machine across the mountains the hundred miles to the Lake. The Richfield gas tanks and the Pennzoil were at the lake to meet us. These firms had provided not only the fuel for our tests but sustenance for the men as well. We carried out take-off and landing tests, speed trials and load carrying. The dry lake surface was smooth and level for a distance of five miles or more. The machine handled the load with remarkable ability, taking off in 2,700 feet and flying at a speed of 134 miles an hour, with the engine full on. We returned to the Western Air Express Field more than satisfied.

By this time we had run up nearly thirty hours on the engine; an amount I had settled upon for several reasons. First of all we wanted to know that the engine was in good shape and it would do it good to have a few hours in normal temperatures before being subjected to the very low temperatures expected at Fairbanks. We wished to become thoroughly familiar with the behavior of both the monoplane and engine before setting out on our long flight. We wanted to become accustomed physically and mechanically with all our equipment while there was yet time to make any alterations or provide any conveniences advisable. But we found little to improve.

As a matter of fact, there was nothing included this year that was not included in our first year's equipment. The only change for greater comfort was the installation of a glass floor in the machine through which to observe instead of looking into the open and suffering from the wind while taking sights for ground speed and drift. We had even foregone the comfort of special heating for the cockpit and cabin, such as was provided last year. We had found on previous flights that dressed in warm clothes as we would be, the extra heating was not needed.

Our engine, apart from the time it stopped for lack of gas, had not missed a beat. I checked carefully after every flight, measured the clearances, kept every plug and joint well seated, strainers clean and oil fresh. Its splendid behavior spoke well not only for the Wright Company who manufactured it but also for the Lockheed mechanics who had so expertly installed it.

After the load tests there was but one thing to do before we should prepare the machine for shipment. I would be pleased to have an expert check the engine and make sure that everything was O.K. We flew the ship to Rogers Field again and there had Jack Wiles, chief mechanic for the Maddox Airline, examine the engine. There was practically nothing to be done. We flew back to Western Air Express and the following day removed the wing and tail surfaces and packed the spare equipment in the fuselage.

The Lockheed, as had been the Fokker machines, was remarkably easy to disassemble and extremely convenient to transport. Our equipment was shipped in three parcels. In the fuselage we packed all the spare parts—skis, radio, etc. The wing was secured in a light wooden jig and the tail planes lightly crated. We had one extra heavy box containing a spare landing gear which we should take to Alaska as a matter of precaution, but so certain were we that it would not be used, that it was already readdressed to the Lockheed Company and arrangements made to express it back as soon as we should leave Fairbanks.

Our instruments, some supplied by the Pioneer Instrument Company and others by the Consolidated Instrument Company, were safe in position in the fuselage. The Lockheed machine permits of surprisingly simple arrangements, lending itself to efficiency and a minimum expense. Freight to Alaska is expensive but I think in 1928 we carried less than three hundred pounds weight of material over and above the actual weight of our plane in flying trim.

We had been fortunate in having fine weather for all our tests at Los Angeles and Muroc. In the warmth of the California sun we had found that the machine behaved wonderfully well. We had used a standard cowling for our test, but provided a set which practically enclosed the body of the engine for Arctic use. An experiment showed that the use of this cowling in

California increased the engine temperature nearly forty degrees. We thought that would be sufficient to take care of the difference in temperatures we should meet.

The problem of keeping the engine warm all the time when at rest was one that exercised us greatly. It was my desire to keep the engine always above freezing but from no source in America could we obtain a lamp or heater suitable for this purpose. To safely serve our need the lamp should use gasoline, burn without flame and be effective and reliable in a wind without requiring constant attention.

Of course, with a little forethought, I could have sent to London for a catalytic lamp, such as we used in the Flying Corps during the War, but I was not certain of the address from which to obtain it and kept putting off inquiry until it was too late. No lamp burning oil under pressure is safe to leave in a wind for a long period and wick lamps are inclined to smoke and soil the engine. After a great deal of trouble and worry I had to fall back on the old Hurricane lamps we had used each year.

The method of heating the engine just before starting was simple. An aluminum tray was fitted beneath the cowling and made to hold one, or two if necessary, blue-flame oil burning stoves. Forty-five minutes to an hour of warming would put the engine in condition for starting. The design of the Lockheed facilitated closely covering the engine. The exhaust ring being inside the cowling and the ends of the exhaust cut short, enabled us to construct a close-fitting hood which covered the engine and cowling completely and also the tray of stoves used for heating. A light canvas inner cover and a waterproof outer cover were provided. The reason for the two covers being that if only a canvas cover was available it might not be sufficient in a high wind; if only a water and wind-proof cover was provided the hoar-frost would form thickly on the inside of the cover during the time the engine was heating up and later melting would run down over the engine or sticking to the canvas make heavier weight to carry in the plane. With the double covering, one of canvas and one of balloon cloth, no hoar-frost to speak of formed.

All these small details were carefully attended to by the Lockheed staff. It was only necessary to mention a desire for the least alteration or adjustment and the work was done. At last I could think of no other thing that we could possibly need and the time had come when we should be on our way to the North.

The *Emma Alexander* of the Pacific Steamship Company was to carry the machine to Seattle where it would be loaded on the Alaska Steamship Company's boat and shipped to Seward. The *Emma Alexander* was to leave the San Pedro wharf on Sunday, February fifth. It was my desire to get the machine on the docks Friday night so as to be certain of no delay but when Friday came we were not quite ready.

On Saturday morning the long expected rain descended. At seven in the morning the Los Angeles streets were rivers. As I drove to the field I saw hundreds of cars with water up to and over their running boards, stalled in the gutters and streets. Fortunately my old relic pulled through until I had almost reached the field before it stalled in a deep, swift flood. It didn't take too long to dry the contacts and I reached the field without great delay to find the trucks for transportation waiting. What with the rain and flooded streets it looked like a sorry chance for us to get the machine over the thirty miles of road to San Pedro before the next morning.

Fortunately there was room in the shelter of the hangar to load the wing on one truck and attaching the fuselage behind we scouted around for canvas and succeeded in covering the equipment fairly well. This took us until twelve noon and the rain was still pouring down. With no sign of abatement we were all low spirited and keenly disappointed. Fortune had favored us so long we had hoped to get the plane loaded and well covered on the boat before wet weather came, but now it appeared everything was to be soaked before we could get it aboard. Since there was nothing to do about it the idea presented itself that we should have lunch before we started so we adjourned to a nearby roadhouse for hot-dogs, hamburger sandwiches and coffee. While we were at lunch the rain miraculously ceased and by the time we returned to the hangar the sun was shining brightly. We drove the trucks from the hangar and along the roads where the water was axle deep for more than half of the way, but hardly a drop of moisture reached our equipment.

I wondered then if it was a good omen—sunshine after storm. Would it prove that way this year? As each difficult situation was presented, I had faith that it would be overcome.

The machine was set down in the shed at the wharf and everything made ready to load the next morning. Eielson had left for Seattle on Friday night. He was to meet his father and sister and spend a few days with them.

Next morning Allan Loughead and Mr. Jay, secretary of the company, came with Ray Shreck and me to see the machine loaded. It was just going on board as we arrived and soon it was safely stowed and covered. We watched the ship pull slowly from the wharf and with it the object which meant so much to each of us. I was jealous at the parting, for practically every day for six weeks I had stood guard over the machine. Not that there was anything to guard it from for it was even in good hands, but I disliked to have it out of my control for a moment. I should have liked to travel on shipboard with it but I had to make faster time to San Francisco and conclude some business there.

I was sorry in many ways to leave my most kind and hospitable friends: The Lockheed staff, the men in the factory; Mr. Keeler, president of the Lockheed Company; Mr. Boggs, his assistant; Dr. Ford Carpenter; Ray Shreck; Norman Day of the Pennzoil Company; Mr. Garrison and Mr. Fuller of Richfield Oil; Lura Shreck, who had been instrumental in disposing of our Fokker machine and helpful in many other things; Mr. C. K. Crane whose father had aided Peary, and many other people who had treated us royally during our stay in California—all added their sympathetic support and had, as we had, confidence that we would succeed.

CHAPTER IV

BACK AMONG OLD FRIENDS

ON the evening of the day the plane was shipped I took train for San Francisco, visited the machine as she passed that port and then proceeded to Seattle to arrange for the storage of the Fokker I still had and for the transfer of our machine to the Alaskan boat. This was safely done and the evening was spent splendidly as the guests of Mr. Thomas D. Stimson at his most beautiful home. Mr. Stimson, himself a licensed pilot, with a machine of his own, is an ardent supporter of the development of aerial transportation. With great kindness he had invited some thirty or more of the principal men of Seattle to dine with us and wish us good fortune and godspeed. It is probably not surprising that most of us who are privileged to do unusual things and suffer public entertainment are quick to sense and differentiate between sincerity and mere custom in these gestures. We felt that night in Seattle—the real jumping-off place for the American Arctic—that the words of Mr. Stimson and his friends were spoken with downright sincerity, and we were much cheered by them.

During that boat journey from Seattle to Seward, Alaska, there was much for me to do. In California the greater part of my time had been devoted to the machine and engine, and if everything were to go well and smoothly there were other things to be attended to. To navigate day after day, year in and year out, brings about a familiarity with the subject which soon makes the work automatic and simple. But when, as a leader of expeditions, one has to turn his hand to many different things, even in an amateurish sort of way, it is easy to forget a mathematical principle or to lose temporarily one's skill in a particular operation. At least I have found this to be the case. For years I have had to be more or less of a jack-of-all-trades, such as engineer, mechanic, laborer, carpenter, naturalist, photographer, aviator, navigator, organizer, lecturer, business man and so on. I think I can say that my ability as a mechanic has been greatly improved by the recent experience in caring for the engine and plane; my knowledge of aeronautics, of instruments and flying had been kept fresh by practice, but I had on the boat to familiarize myself with the feel of the wireless telegraph key, the International Morse Code, my sextant and astronomical tables and refresh my understanding of meteorological principles covering the laws of storms and air movements. There was little time for gossip.

Seward was reached on schedule, but promptly came the news that we would be delayed for some considerable time. The weather at Seward was unusually warm for that season of the year; much snow had melted from the streets and the gutters were overflowing with water. It was no wonder that the snow, exceptionally deep this year, had come sliding down the mountain sides covering the railway tracks. The Alaskan Government Railway staff worked with energy and efficiency, but we were a week late in reaching Fairbanks.

We arrived at Fairbanks the evening of Sunday, February twenty-sixth. Our plane arrived by goods train the next day. A few of our old friends met us, but they were not enthusiastic. Their manner of saying, "We know you will make it this year," implied there was nothing else to be said, but they thought as did others that our equipment was too meager.

Of course, there were the proverbial exceptions: Joe Smith—Gun-store Joe Smith, of the old Alaskan days—a sincere friend, was still certain of our ultimate success. He had hoed the row in Alaska for many years and knew the whims and ways of the Great North, north of Sixty-three. Dr. de la Vergne, the Mayor, was "Outside" on a brief vacation. Mr. Hutchinson, the bank manager, was kind and courteous as usual. Old Bob Lavery, manager of the Fairbanks Airplane Corporation, as pseudo-cynical as ever, hiding beneath that mien his really compassionate nature, gave us welcome. In business for his company he was as sharp as could be. The first year when we had come with a glare of great publicity and were not short of funds we were loaned gratis a flying field and hangar. Last year, with four machines and equal time spent there but not more trouble, he thought it necessary for us to recompense them for the use of conveniences afforded, but this year, when I was depending upon my own resources and could least afford to pay, had only one machine and would remain but three weeks instead of three months, he demanded three times as much as we had paid before. So it goes! Unto him that hath much shall be given, but to him that hath little much shall be charged.

The weather was still warm when we reached Fairbanks. The water dripped from the roofs of houses. The streets were ankle deep in slush, making conditions extraordinary. A year ago on that date we had been assembling our machines in temperatures of forty-eight and fifty below zero Fahrenheit.

Because of the simplicity of the arrangements this year we were required to hire only two men to help us assemble the machine in Fairbanks, and this work was done in less than three days. True it is that we are unboundedly indebted and grateful to many men in Fairbanks and particularly this year to the men of the Arctic Prospecting Company, who were also assembling a machine in the hangar. Many willing hands on many occasions helped with heavy lifts and in bringing the machine in and out of the hangar. We are deeply appreciative of all this voluntary help.

Within a few days the weather cooled and in temperatures of twenty to thirty degrees below zero we carried out our test flights. These showed there were many motor adjustments to be made. The engine, in spite of close cowling, enclosed exhaust pipe and oil lines lagged with asbestos, ran cold; the oil remaining at a temperature sixty degrees below requirements. That meant many small additions to the cowling and the fitting of these was an awkward job. Each small hole in the cowling was as far as possible sealed. I bound the carburetor with asbestos and covered all the exposed parts of the induction pipes. The exhaust pipe, leading to the heater fitted and arranged to heat the air before it entered the carburetor, was lagged also and the binding of these pipes, after the engine was assembled, was a knuckle-skinning job.

We tried the engine again and the oil temperature went up forty degrees, but was still too low with light loads. When too cold the engine would spit and splutter. Turning at over sixteen-fifty revolutions it functioned perfectly. Our experience in previous years had shown that it was advisable in cold weather to increase the size of the main metering jets, but I was most anxious this year to keep the main jets small in order to reduce gas consumption as much as possible.

Curves plotted after trials for engine speed and gas consumption showed that for the best air speed throughout our total journey we should run the engine between sixteen hundred and seventeen-fifty revolutions. So long as the engine would run smoothly at sixteen hundred I prefered not to change the jets. I took the precaution, however, to provide larger jets in case they should in future become necessary.

We had discovered on arrival at Fairbanks that much of the equipment we had stored there was missing. Some of it mysteriously reappeared upon our return, but some of it was never found. Among the things lost was a special four-purchase light, wooden block and tackle which had been especially made in New York in 1926. It was to be used, if we had to move our machine, should we come down on the sea ice with a heavy load. It was possible that we might need it badly this year and we did; when and where will be told later. We could not, however, replace this special block in Fairbanks, neither was there time to get another from New York, so we had to go without. In all there was a great deal of petty pilfering of our tools and spares at Fairbanks during the first two years, but this year with everything under my personal supervision and with the aid of locks and keys, nothing was lost.

I had planned to leave Fairbanks any time after the middle of March and before the first of April. Alaskan Arctic meteorological records and my own experience show that some time between the middle of March and the first week in April there occurs a period of bad weather at Point Barrow. Last year, as has been told, we tried to take advantage of those storm conditions. This year our course lay in another direction and it was my hope to be able to take advantage of the fine period which usually follows the few days of storm. We would be glad if this clear calm period would not occur until after the fifth of April, when the sun would be above the horizon throughout the whole period of our flight.

Therefore, when all was ready, I was in no great hurry to leave Fairbanks and was willing to remain until after the *tombola* in aid of a building for the Fairbanks Post of the American Legion. The officer-in-charge of the Post asked if I would grant Eielson permission to carry the American Legion Flag—a request I was pleased to grant.

There was one very real reason for wanting to reach Barrow a few days before the flight. Eielson, who is Alaska's popular hero, has in Fairbanks as everywhere, many friends. Many of them, I know, thought that he was heading for his doom. They admired his pluck and determined that he should have a good time before he departed. His round of social obligations gave him no rest. I could, on the ground of business pressure, refuse invitations, but Eielson had no excuse and was kept going night and day. It was advisable for him to get away to Barrow for a week or two before starting on our long flight.

On the morning of March nineteenth everything seemed favorable. We did not leave a stone unturned in preparation for a successful take-off. Early in the morning we routed out a teamster with his team and in the cold, clear atmosphere we hitched the horses to a heavy raft and dragged and redragged the field. Expenses were mounting up, but we had been economical in other things and could afford to give the machine the maximum facility.

One hundred and thirty more gallons of gas and ten gallons of oil were filled into the tanks. With our spares, equipment and food to last thirty days' travel over mountain or tundra, in case we should be forced down on the way to Barrow, we had quite a load. It was just as pertinent to be well prepared on that trip for an emergency landing as for the trip over the Arctic sea ice. It would be almost as difficult to reach some habitation as it would from the Arctic ice. For this heavy load we had just fifteen hundred feet of runway for the take-off.

The air was cold; twenty-four below zero Fahrenheit. Could we make it? Some of our friends came to the end of the runway; many others lined the field. Eielson gave her the gun and the men swayed the tail of the machine. We quickly gathered speed and slid along the polished surface. From the start it was evident that we were going to get off and at the end of the runway we left the snow as smoothly as from a concrete highway. Without more ado we headed on our course for Barrow.

On that trip there was really nothing for me to do other than test my instruments and amuse myself with the wireless. Eielson knew the course by heart and the weather was clear. The horizon was sharply outlined over Livengood and the Yukon we passed at the rate of 115 miles an hour. The machine was buoyant and eager, as if anxious to greet the Arctic Sea. Up and up to eleven thousand feet we climbed, our sense of security much in contrast to our experience each other year when we had squashed lifelessly along, sweating and straining as it were to make the grade.

From a thousand feet above the mountains we looked down on peaks between which we had threaded our way on previous trips and which we had dodged in bad and cloudy weather with particularly narrow margins many times during 1926 and 1927. Eielson, with his usual care, swung to follow a river valley which would afford a safe landing field if necessary. Noticing that he had turned from the direct compass course and forgetting for the moment my customary cautiousness, I leaned over the tanks and asked him to keep on in a straight course for Barrow.

After crossing the Endicott Range we flew over a low bank of clouds and then ran into a fairly strong northeasterly wind. It was this cold wind, no doubt, that cleared the atmosphere and we had a serene course to Barrow. With the engine throttled back and losing height we speeded on toward the Coast. This trip over the Arctic slope was one of the rare occasions when we could see every detail on the snow-covered tundra, but the details on that two-hundred mile stretch of flat land between the Endicott Range and Barrow on the Arctic Coast are few.

Here and there we saw some caribou tracks and occasionally a small band of the animals themselves. My gaze was fixed toward the North and over the distant Arctic ice. I wondered what it had in store for us and dreamed many dreams. Eielson, looking right and left in the direction of the mountains which stretch out toward Bering Sea, saw a moving herd of many hundred, probably thousands, of caribou. It was impossible to estimate their number either from the ground or air. Over the Colville River we passed, followed the Ikpikpuk for a while and struck out for Barrow.

Before we reached there the wind increased and with its force the snow was bound to drift. Air conditions became hazy. We turned slightly west and hit the Coast a little south of Barrow. In a few minutes we were over the village. The Eskimo ran from all directions; we circled and landed, the engine missing badly as we lost height and closed the throttle. It stopped as we hit the snow, but I climbed out and after one swing of the propeller it started up again. The air at Barrow was extremely cold. It had been forty-eight below that morning.

We taxied to our old stand near the Trading Post and were welcomed by our friends. Charlie

Brower, Fred Hopson and Harry Riley were there. Brower had returned last summer and Riley's wife had come to join him. Three new faces were at Barrow: Mr. Vincent, the new school teacher, and his wife; Dr. Newhall and his wife were still at the hospital, but a new nurse was in charge. Our Eskimo friends flocked around, all smiles and welcome; curious to see each new thing we had brought and struggling between themselves for the privilege of carrying our gear to the station warehouse.

CHAPTER V

WATCHFUL WAITING

IT was good to be back again. Barrow had become a second home—a Spring residence for us during the last three years. The principal news was that the schoolhouse had burned down early one morning shortly after the New Year. The schoolmaster and his wife had escaped in their nightshirts, or whatever it was they wore, and little else had been saved. They were loud in praise of their neighbors' generosity in providing them with all the necessities and comforts. School was now being held in the house which had been occupied by our men in 1926. The school teaching staff lived in a low frame house nearby. Charlie Brower was the same as ever, cordial and helpful. Fred Hopson, still cheerful and hearty, but not so thrilled this year with a present of cigars we had brought him from "Outside." "Haven't been without cigars all winter, Cap," he said, "had some from here and there and there's still several boxes in the store." But I don't know what else we could have taken Fred Hopson for his pleasure. Our annual visits meant much more work and trouble for him and no more pay, but he did not mind and in short order had cups of steaming coffee for us.

The people at Barrow were enamored of our plane. "She looks like the goods," they said. But planes were now passé and no novelty to the Eskimo and our arrival looked upon as an ordinary event—with the possibility perhaps for profitable arrangements.

The machine became the center of the children's playground. Around and about they ran and chased each other; dodged beneath the tail pieces and beneath the landing gear. One day we were alarmed by the story that reached us as we sat at the Trading Post. "That crazy Eskimo boy took a gun and shot into the wing of your plane," we were told. We hastened out to see what damage might have been done and were mightily relieved to find that the "crazy" Eskimo was a little fellow eight or nine years old who had amused himself by shooting at the wing with a small sling and some pellets. The missiles had scarcely dented the woodwork, but as we investigated I thought what a fine story had been spoiled in the making: *Eskimo, Mistaking Airplane for Evil Spirit, Brings Down Wilkins and Eielson with a Discharge from His Gun* would have made a splendid headline for the sensational press.

We took advantage of the Presbyterian Mission's generous offer to make use of their Delco engine to drive our wireless generator and installed our short-wave set in the basement of the hospital. Two-way connection was established with the Army Signal Corps at Seward, Alaska. We had found the Army Signal Corps each year most obliging and helpful. Sergeant Messer at Fairbanks during 1926 and Sergeant Reeser in 1927-28 had spared no effort to be of genuine service and they went to considerable trouble to help us. A mechanic, George Maki, this year gave me most valuable aid. While still at Fairbanks, we had been in more or less regular communication with San Francisco through the efforts of Fred Roebuck at short-wave station 6-ARD.

Once we had communicated with our friends and told them that we were safe at Barrow, I did not care to use the wireless extensively, believing it wise to conserve it for our Arctic flight.

For three weeks our plane stood idle on the lagoon at Barrow. Eielson read and ate and slept and rested to his heart's content—and surfeit. My time was fully occupied. There were many things for me to do. First, our Arctic clothing had to be carefully inspected and repaired. Eielson needed a new fur shirt and so did I. Mrs. Brower, a most careful and skillful seamstress, undertook to make these for us, but first the deerskins had to be scraped by other women. Snow shirts and snow trousers—coverings for our fur garments—were to be made from the pongee silk I had brought with me. Pongee or some other good quality of hard-woven silk I find best for use as outer garments in the Arctic. Snow does not stick to silk as it does to cotton and silk does not absorb moisture as readily as cotton. It is partly wind-proof yet sufficiently porous to allow the hoar-frost to form on the outside rather than the inside, as it does on any type of rubberized or wind-proof material. Silk wears well, serves well and is well worth the additional initial cost.

Our sealskin boots, two pairs with hair inside, suitable for cold weather, and two pairs of high waterproof boots were oiled, rubbed and made to fit by the younger women. We carried many pairs of insoles made of gunnysack in strips and rolled to make good pads for the feet and we each had four pairs of special woolen socks made and presented to us by the Woolen Mills of Detroit. These are the most valuable of the kind I have ever used in the Arctic. We each had a pair of fur and one pair of sealskin trousers and a double fur shirt or parka. We had two pairs of fur mittens each, a woolen pair to use about the engine as well as a pair of waterproof mittens; snow glasses and a spare pair each; a pocket compass; waterproof match box; hunting knife and file were among the equipment each of us should carry. Instead of the two-man half sleeping bag we had carried last year, I had made this year two one-man half bags reaching to our hips and covered with waterproof cloth. Had it been necessary for us to carry our packs as it was last year, we could have dumped all of our gear into the sleeping bags and made packs of them. We had two pairs of snowshoes and these could be used for back packs when not needed on our feet. The snowshoes we took this year were rather larger than those carried before because there was a possibility that we would have to walk some distance over the deep snow on the mountains of Spitsbergen.

For food this year I decided to take more pemmican than last year and our list contained twenty pounds of it; biscuits twenty pounds; malted milk twenty pounds; chocolate five pounds; raisins five pounds and a few tins of emergency army ration as an extra-emergency—in case of temporary forced landing. I took a carton of cigarettes to while away the time should we meet with temporary injury. I included some chewing tobacco, for I have found from experience that the nasty taste of it sometimes helps one to forget other things not quite so nasty—in effect a counter-irritant.

For cooking we had a Primus stove; a two gallon aluminum pot; two spoons, a fork and two enamel cups. During the flight we would use coffee from our thermos bottle but we took no extra tea or coffee among our supplies. Long acquaintance with such matters has taught me that it is troublesome to wait to boil water just for a beverage. If meat must be cooked the delay can't be helped and then you have the soup. But when living in tents or snow-houses I prefer to have food that does not require cooking and to drink cold or warm—not boiling—water. If any steam is made in a tent or snow-house it will condense and fall as hoar-frost down the back of your neck or on your clothes and wet them; so, though we had four quarter gallon tins for carrying fuel, we expected to use the stove as little as possible. One of the tins was filled with alcohol for use in the plane in case of temporary delay; another was filled with ether for anæsthetical purposes in the event of serious accident needing surgical operations—or for starting the engine in extra cold weather.

For use in hunting, we carried again this year two Mannlicher rifles and carefully hand selected three hundred and fifty hollow pointed cartridges. The hard-nosed hollow pointed cartridge I find more suitable for rough usage as it does not get damaged as does the soft-nosed and we have found the hollow pointed more accurate and equally effective. We had a long handled spear equally suitable for spearing seals through the ice, chipping a hole for a sounding, a tent ridge pole or recovering seals which we might shoot in the leads of open water. To the seal spear we could attach a deerhorn and whalebone ladle, used for lifting the ice from a small diameter hole which we should cut if an opportunity for taking soundings occurred. We had two coils of stout cod-line and some sealskin throngs to be used as harness for hauling sleds or other loads.

Our sewing kit contained curved and straight glovers' needles, cotton, silk and sinew prepared for sewing boot soles and clothing; some wool and darning needles for mending our socks: an Eskimo scraper made to fit the hand and used for scraping skins to be used for clothing, a bar of coarse soap for tanning and softening small skins for socks and shirts—should we land on northern Grant Land or Greenland and spend many months or years in walking home we might need these. We would each carry a handkerchief, a toothbrush and paste and beard clippers. And, as a demonstration of our confidence in reaching Spitsbergen, we would take our razors and hair brushes! Our razors and hair brushes were the only absolutely unessential features in our equipment.

I had prepared a light waterproof tent constructed along the general lines of the canvas for a covered-wagon. Its shape was maintained with the aid of strong but light rattan. It would be a protection from rain in the summer and could serve as a lining for a snow-house during colder periods. We had a double edged saw and two snow knives for building snow-houses and an Alpine axe for chipping ice and testing ice thicknesses in dangerous leads. A small scout's axe was kept handy in case it became necessary after a crash to chop either of us from the plane. Our first-aid kit was small but complete with surgical instruments, medicines, drugs and ophthalmic requirements.

It took some time to accumulate and stow all these details of equipment where they would be least in the way and still remain accessible. Our Sonic Depth Finding Apparatus, consisting of many detonators, a sound receiver, an amplifier, ear phones and batteries, was kept handy in the navigator's cockpit together with the ice-pick and whalebone ladle, the old manual sounding gear I had contrived from a moving picture reel, a revolution counter for measuring the length of line paid out; sounding weights, reversing thermometers, and a grabber for collecting bottom samples and to which I had soldered four small bottles for collecting water samples. These bottles were arranged in such a way that when the grabber closed the bottles would be corked. All this equipment had been provided in 1926 and some of it used in 1927 so this year I had only to assemble it and see that it was in working order.

. . . . .

Each day at Barrow I would practice observing the sun with the Royal Air Force Bubble Sextant and a small pocket sextant and work out positions by astronomical methods, using a special stereographic chart, curves and tables prepared and supplied by the American Geographical Society under the direction of Mr. O. O. Miller of the Society's School of Surveying. It is one thing to know how to take observations of the sun and another to take them accurately from an airplane under cramped conditions and when speeding through the air at the rate of a hundred and twenty miles an hour.

Because of the difficulty we expected in connection with magnetic declinations on the course we were to follow I did not expect to reap much advantage from any type of compass, but decided to use in the navigator's cabin an eight inch boat compass and a prismatic surveyors' compass but I would depend most of all on sextant observations.

CHAPTER VI

AN ARCTIC LABOR PROBLEM

BY the third of April everything was in readiness. All the equipment that I thought we would need, except the block and tackle stolen from Fairbanks, was stowed in the plane. In place of the block and tackle I prepared a light rope ladder which I could sling out of the cockpit should it become necessary for me to stand outside the plane and shove to get it started.

The course I proposed to follow this year was from Barrow to Latitude 84° N., Longitude 75° W. and from there to the northwest corner of Spitsbergen (now officially named Svalbard). It would cross the area in which Peary, Stefansson and MacMillan saw indications which led them to believe land might exist in the Arctic Sea. I plotted our course on several charts; worked out our probable positions for varying speeds and winds and time of starting. These courses marked on stereographic charts are straight lines and almost a true circle course. I proposed to change our direction every hundred miles. There would necessarily be careful checking and plotting of our speed and drift during flight but I was agreeably surprised to find, when marking each leg of the journey involving at least twenty-two changes in as many hours, that the compass changes would not be nearly so great as it first appeared from a casual glance at the chart on which magnetic variation is indicated. The compass error of declination would vary from thirty degrees East to one hundred and eighty degrees, when the north end of the compass would be pointing South, and then on to fifteen degrees West; in all three hundred and fifteen degrees or forty-five degrees less than a complete circle.

But I learned on plotting my course for the entire journey that the greatest hourly change would be between the tenth and eleventh hours and amount to twenty-six degrees. Since it is not possible to keep an absolutely straight course with an airplane it would be requisite for me to keep a careful check of the variation and direction of flight and by constant observation and watchfulness during the flight compensate from time to time for the error.

I had, since arriving at Barrow, kept a careful check on the meteorologic conditions. Because of this I was expecting the three days' blow which commenced on the third. It continued the fourth and fifth of April and was followed by a clearing of the atmosphere and a south wind on the sixth and seventh.

For several days ahead I had forecasted these conditions and had not even troubled to move the plane or start to prepare a runway, but on the afternoon of the fifth and all day on the sixth thirty Eskimos were busy shoveling the snow from the ice. With the help of men and dogs we moved the plane to the part of the lagoon from which we should start and Eielson and I filled the tanks with gasoline.

From observations on the night of the sixth I figured that if we could get an early start on the morning of the seventh, before the south wind thickened the air, we might run before the wind for several hundred miles. We would probably meet headwinds on approaching Grant Land and perhaps foggy weather there but if the morning's weather turned out as expected we would try to get off. The only thing that mattered would be the cross wind on the runway which had been arranged on a northeast-southwest direction.

AN ARCTIC LABOR PROBLEM

At three o'clock in the morning I was up for observations. A light wind from the South promised stronger winds later in the day and the thing to do was to get off before it was too strong. I hurriedly donned my flying clothes, lit the kitchen stove and put the oil to warm. Then I went to the plane to light and adjust the stoves for heating the engine. By five o'clock the engine was warm and ready. Leaving Ned, our Eskimo helper, in charge, I turned back to the kitchen to waken the cook and Eielson. I was dismayed to find that the oil, becoming overheated, had boiled over the edge of the cans and had swamped the kitchen stove and floor. The smell of the burning oil had wakened the cook and he was now prancing about his kitchen saying little and thinking quite a lot.

It took me nearly three quarters of an hour to clean up that mess of oil, have a hurried cup of coffee and get down to the plane. I had hoped to have the engine running long before, but I now found that Ned—much concerned at my long absence—had removed the stoves fearing the engine would get too hot. That caused another delay. The wind by this time had increased. It was almost too dangerous to attempt a cross wind take-off but since we had made ready with so much bother we concluded we'd at least run down the runway and see how the machine behaved. If we did get in the air and did not like the conditions we could dump the gas and return.

Eielson gave her the gun, the Eskimo wiggled the tail and we started. I was surprised at the ease with which we moved. We accelerated but it was soon evident that we would not get off before reaching the end of the runway. How would our skis behave on the snow? Before coming to the end of the ice Eielson pulled back the stick to try and force her off and the tail came down with a bump that shook loose the trigger we had provided on the tail-skid for an emergency brake. It certainly acted as a fine brake, scoring a gutter three inches deep in the tough sea ice. Our speed was considerably decreased and fortunately so, for when the machine bounced off the end of the runway the side wind caught her and flung her to one side. We landed with most of the weight on the side of one ski. It gave way and we ploughed through the snow in a circle and came to rest. One ski was badly broken, the other was all right and no other damage was done. The metal skis we were using were beautifully streamlined and light. We

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"THE COURSE I PROPOSED TO FOLLOW THIS YEAR WAS FROM BARROW TO LATITUDE 84° N., LONGITUDE 75° W."

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PREPARED TO KEEP WARM IN ESKIMO DRESS

were overloading them tremendously but they were not well designed. They were strong from a fore and aft point of view but weak to withstand side thrusts. We had tried to get the designer to increase their strength in that respect but he had refused. Last year one of our skis of similar make went in similar manner when we landed in the dark on the ice. Even that did not convince the designer and this year we tried to strengthen the skis ourselves, but after they had been riveted together there was not much we could do.

It was an easy matter to remove the metal skis and install the stronger wooden pair we had brought with us in the plane to Barrow. Then with the aid of dogs and men we had the machine back on the runway ready for flight in two hours. But by this time the wind had increased and the weather was not favorable for a take-off.

I thought best during the delay to lengthen the runway as far as possible. The Eskimos worked with a will as I was to pay them six dollars a day and give them an occasional meal. They could not be induced to start early in the morning but they worked as late as I would stay with them. That was until about seven P.M. which made a sixteen hour day for me. The

Eskimos are rather averse to working on Sunday but in my interest they turned out and finished the runway right to the end of the lagoon, which was three thousand five hundred feet across at that point.

At the end of the runway the bank of the lagoon rose gradually to a height of about fifteen feet. I asked Eielson if, when he was about to take off, it seemed we were not going to rise that he either stop the engine well before we came to the end or else keep going until after we had climbed the hill. The momentum and the engine would carry us over the top of the bank and we could come to no harm on the level, soft snow but a sudden stop on a rise might cause the machine to turn up on its nose.

On Monday the weather was still uncertain. I put the Eskimos to work widening the runway and went to look at Elson Lagoon—which extends for many miles along the northern shore to the east of Point Barrow. If we could not get off the Barrow lagoon the Elson lagoon would serve. We could make a runway miles long if necessary. I was fully confident that the machine would handle the load when once in the air.

Tuesday came and the clouds and fog remained. Towards evening there was a sign of clearing in the northwest. In the morning there would probably be a northeasterly or north wind and we might try again.

At three A.M. on Wednesday morning there was a light movement of air from the North and it would mean, if we left, head winds for much of the way but clear weather. I decided to make an attempt. I had no trouble this time spilling oil. Breakfast was over and we made all arrangements for starting with smoothness and ease, but Ned the Eskimo, remembering the scolding he had received, had this time pumped up the stoves and got the engine so hot that the high tension wires leading to the spark plugs were badly scorched. However, they were not dangerously so and we climbed into the machine and Eielson gave her the gun again.

Once more we slipped smoothly along the icy runway gathering speed all the time. The wooden skis seemed to slide as well if not better than the metal ones. It looked as if we might get off this time. If a light head wind had prevailed instead of the gentle breeze across our track we could have managed it. I could feel the ship getting light. She was eager to take the air and almost lifted as we came to the end of the runway. We struck the snow and careened up the bank of the lagoon and over the snow covered tundra at the top. Right over the hill we went and down the other side. Eielson had gradually reduced the throttle when we struck the snow and we came to rest slowly. I trembled for fear that some damage might be done to our light wooden skis. But no, the machine rested on an even keel and a quick examination showed that everything was safe.

I was jubilant, almost as happy as if we had taken off. We were sure now that our machine could stand hard usage if necessary and her buoyancy at the end of the runway proved that only a few more feet would be necessary to enable us to take off even in a calm; with a head wind she would be well away.

No time was lost in getting two teams of dogs and some men to help haul her to the Elson Lagoon. To make a new runway would take time and money, but it was better to be sure of having plenty of length in case the wind should fail us. In three hours we had drained the gas from the wing tanks, hauled the ship to the lagoon and were busy on the new ditch in the snow.

Soon we must leave or the weather might become unsettled and fog hang low over the ice.

I pitted one team of fifteen men against another and they slaved like Trojans for an hour or so, but unaccustomed to hard work the Eskimo quickly tires. Their pace soon slackened and we worked steadily all that day and the next day, but we had a runway much smoother than the one on Barrow Lagoon. Thursday had been an ideal day. We had spent our time digging snow and extending the runway.

At three on Friday morning the weather was still fine and appeared likely to remain so. There was scarcely any wind. I was afraid to trust the weather too long and decided to try once again, knowing the runway was not long enough but hoping to gain such speed by the time we reached the end of it that we could career over the loose snow for some distance and finally get into the air. We tried this but found that as soon as we struck the loose snow we lost speed. There was nothing to do but shut off the engine, take the ship back to the end of the runway and clear the snow from the ice for a greater distance.

All Friday and Saturday we slaved. I hired every man and boy that came within hailing distance. The pay and the food attracted them. I am certain that these good fellows worked much against their will but for the sake of their friendship for us they worked well. By Saturday night we had a runway a mile long, perhaps longer, I was too dog-tired to measure it. I was forced to dig and shovel with the men to get them to keep up the pace. Hands blistered from the use of the saw would find relief in handling a shovel and when new blisters appeared it was a chance to get back to the use of the saw and pick again. I was satisfied that if the wind still held—it had freshened to a breeze from the northeast during Saturday—we would be able to get into the air in the morning.

The freshening wind blowing lightly from the north, then stronger from the northeast, and the darkening of the far horizon in the South, as we drove to the village after nine o'clock that night assured me that if my understanding of weather conditions was at all correct there would be an easterly breeze in the morning—changing to south by night with thick weather and snow at Barrow, but by the time weather conditions became bad at Barrow I hoped to be a thousand miles away. Utterly tired out, I slept like a log for four hours and as I rose at three A.M. I could see by the brightness of the light in the room that the weather was still fine. A light breeze coming from the east by north had already started its swing to southward. We must lose no time in getting under way.

I lit the kitchen stove, put the oil to warm and went to awaken Ned who had promised to hitch up his team if I needed him and with another man take me to the runway where there was still a little work to be done. We were compelled to level a ridge of bulging ice from the runway to make it comparatively safe. It was none too wide at any point and a slightly uneven surface might cause the ship to swing and crash into the snow banks on one side or the other.

Fred Hopson, cheerful and unminding the repeated three o'clock awakenings for our activities, cooked me a splendid breakfast. Eielson was to sleep two hours longer before breakfasting and then with two men bring the oil to the field. Ned said he would go to his brother-in-law's house, awaken him, take his team and be ready waiting for me. I dressed in heavy clothes and went along to where I expected the dog team. Ned was not to be seen. I knocked for ten minutes at the door of the house before a sleepy, half-clad man peered out and then he could not or would not give me any definite information: "Ned gone village" was the sum total of his expression.

I could not understand this. Ned had never disappointed me before. He was usually ready in time if not before time and was a most willing and helpful worker. He had been putting in long, unusual hours for the last several days and perhaps was getting tired of it. I could note by the tracks that he had been to the house and other tracks led toward the village three quarters of a mile away. I was impatient at the delay but had no choice other than to go to the village and endeavor to locate the men. Ned was not at his home and after routing out several men from other houses I still had gathered no information.

At last I headed back for the Trading Station to see if Ned was awaiting me there and on the way saw him harnessing the dogs before the house of Fred Hopson's son-in-law. As I approached Ned explained that his own brother-in-law who had promised the night before to help with his team, had later changed his mind and refused to stir. Several others had likewise refused to aid but finally Dean, who had always been a willing helper, had agreed to go if he could have his breakfast first.

Ned was as chafed as I at the delay but there was no help for it. Shortly we were on our way to the plane. There we lit the stoves to warm the engine and with two ice-picks and a shovel set about reducing the bump in the ice. We had just finished that work when Eielson and Dave Brower arrived. It was getting on toward ten o'clock and I had hoped to start by seven or eight at the latest. The engine was by that time quite warm. The wind had swung and was a little, but not too much, from straight up and down the runway. The weather conditions were favorable and if only we could get into the air I believed we would have a good journey.

Eielson had brought the oil wrapped in a double sleeping bag. It was poured into the tank and the outer cover of the engine removed. The windows of the plane were cleaned as best we could. I filled all the grease caps on the rocker arms of the engine, dropped the tray used for heating and once more we were ready to start.

CHAPTER VII

A PRAYER OF THANKSGIVING

"SWITCH off?" to Eielson.

"Switch off," he answered.

"Gas on?" I asked.

"Gas on," he said.

I swung the propeller sharply through three or four turns to suck gas into the cylinders, placed the blade at an angle marked previously to show when one piston was in firing position, then shouted:

"All clear?"

"All clear," Eielson answered and snapped on the switch. He swung the booster magneto and as she had done each time we asked her to start, the engine coughed once, kicked back, coughed again and then emitted a steady purr. My heart swelled with thankfulness. The engine sounded fine and though the direction of the wind was not perfect it was still very good.

The weather forecast, as I understood it, was in our favor for the greater part of the journey. We must chance what we might find at Spitsbergen. The only regret was that five gallons of gas I had intended to pour into the tanks before starting had leaked out during the night. There was no more on the field and without time to send back to the hangar we were forced to leave with the tanks not quite full. However, I felt we would have sufficient to cover our flight.

I climbed into the navigator's cabin and shouted, "Let's go!" to Eielson. The Eskimo men yawed the tail of the machine and we slid off the boards we had placed beneath the skis to prevent them from freezing to the snow. Away we went quickly gathering speed as we passed down the runway. The floor of the track was slightly undulating and as our speed increased Eielson had a difficult task to keep the fast-moving plane within a width of fourteen feet. Thirty, forty, fifty miles an hour, we gathered speed as we progressed, the machine behaving like a proud horse tugging at a load. From the cabin window I could see the tail planes swaying and missing by no more than a foot first one bank and then the other. I marvelled at Eielson's skill and courage. An error of a few pounds pressure on the rudder, a swing of a few inches one way or the other and we would have hurtled into the snow bank, our skis would have buried themselves beneath the blocks we had thrown from the runway and disaster would have surely followed.

Eielson kept his nerve. I prayed. Sixty, seventy miles an hour. We lifted, swung sickeningly, touched the ice again—then soared smoothly into free air. Never has there been a more fervent prayer of thanksgiving than the one I uttered.

Our greatest danger was passed. The regular hum of the engine assured me all was well with it. The machine climbed beautifully—no squashing along with tail down to give one the feeling that at any moment she might drop plummet-wise to destruction. No. No! She was a thing of life; buoyant, swinging out with a manner true and straight, seemingly matching her will to ours. I thanked God for the understanding of the man who designed her; for the honest, conscientious men who had built her and for the skill and wisdom of the man at the controls. I was conscious of the great privilege of guiding her on her course.

I passed a note to Eielson: "Wonderful take-off. How's everything?"

"Everything great!" he shouted through the speaking tube. "She handles fine. Engine turning seventeen twenty-five. Temperature hundred and twenty."

We had previously discussed the first leg of our course in relation to the sandpit at Point Barrow so Eielson could swing and take up his departure from that point. I fixed the articles in the cabin, all of which had been piled up forward to gain the best advantage in the take-off. As soon as the compass was clear I got observations for drift and ground speed.

Ground speed was 108 M.P.H. Drift ten degrees to the left. Wind at low altitude was slightly north of east, a little against us, but that I did not mind. We were by that time thirty miles over the Arctic Ocean and I was sure that the wind would soon change. The horizon to the North and East was as clear as clear could be. The ice, after we had skimmed over the lagoon and crossed the rough high-pressure ridge near the shore, was badly broken and much open water was in evidence.

For the first fifty miles these conditions prevailed. The wind by that time was lighter and south of east, but I was cheered by the fact that the loose ice was no longer drifting in the sea. It was stationary or if moving at all was going against the wind. This indicated that the wind from the East would soon be over. It would swing to the southeast, south and southwest and because of this we would be assured of fine weather for the first few hundred miles. Then we would meet a calm, probably some fog and again clear weather toward Grant Land. There was no guessing at that time what it would be like further on.

We flew on and on and I was busy as a bird-dog for the first few hours, settling everything in the cabin. I put out my charts, tested both sextants for index error, and put them in order. I tried the gas pump to see that it was clear, made sure the dump valves were free should we have occasion to use them; set the wireless aerial, testing its note to get the best resonance; made sure the drift indicator was registering true and changed it from side to side. I discovered my stop watch would not function if left in the cold cabin and had to keep it in my pocket.

I had little time to write notes or closely examine the ice, but I had plenty of time to notice that a forced landing anywhere during the first three quarters of an hour would have been our last. There was no ice smooth enough or fields large enough for a machine to land, so badly broken was the pack-ice. I had supreme confidence in our machine and in finding good landing fields further out to sea.

After about two hours I observed a change in the wind or rather an absence of it. Judging from the slicks beside the ice walls of the leads the wind was slightly south of east on the ground and in the air at 3,000 feet it was from a little north of east. The leads near the coast north of Barrow ran east and west, but swung round boomerang shaped in a southerly direction west of Point Barrow.

For the first hundred miles we flew at an altitude gradually rising from five to eight hundred feet. From that distance to the ice pack we could see every detail clearly. About a hundred miles from shore the ice became heavier and ridged. The ridging seemed to be the result of heavy packs coming from the northeast and, moving against the shore, pressed the lighter ones moving west. The direction of the ice falls indicated the direction of the greatest pressure.

My long experience in travelling over the ice on foot, watching it grind and pile itself in ridges, of finding my way by the direction of snow drifts, here proved useful many times. In earlier years I had stood upon the ice and watched it squirm and pile in jumbled masses. I had listened to it groan under the pressure of high winds and swift moving currents. At the beginning of pressure the edges of two packs would come together with a dull, rasping sound, increasing to a groan as the pressure mounted. When under great force the huge blocks of ice issued sounds like the sobbing and wailing of a suffering child. To stand in their midst, uncertain of safety, not knowing whether the ice on which one stood would, the next moment, rise and tilt or spew one into the seething mass had been awe inspiring.

As I rode comfortably in the plane those half-forgotten experiences of travelling on foot came back clearly to my mind. Many times while I sat in a small, roughly fashioned snow-house, sheltering from the driving snow and watching the drifts pile high, I had studied the manner in which the drifts had formed and sometimes, no doubt, cursed the Fate that had placed me among such conditions. Nonetheless those experiences were standing me in good stead. Each snow drift and ice ridge had a story to tell. To watch them as we passed above was like reading a familiar tale.

The larger snow drifts on the ice a hundred miles north of Barrow had been formed as the wind blew back from the East or West. There were smaller drifts running in various directions and this condition interpreted showed there had been winds from both East and West during or immediately after snow storms. The winds might have been more constant or equally strong from some other direction, but they had blown at lower temperatures and after the fresh fallen snow had hardened.

Nearing latitude seventy-three on our course the narrow leads in the ice ran east and west, but in the distance to the westward I noted their direction trended more toward the North. That surely meant one thing. Leads most generally form at the edge of some obstruction where the ice, meeting great resistance, presses up in ridges under the force of wind and current and when the force being exerted upon it is reduced the ice slackens, leaving lanes of open water. Or, if a high wind drives a heavy deep-riding floe the lighter pack is driven ahead of it, also producing leads. The sight of these curving leads informed me that we must soon pass over some evidence to account for them.

We came to that evidence in the form of

heavy, old ice obviously deep in the water and in which there were no leads. The light wind from the eastward failed to move this heavy pack as quickly as it moved the lighter ice further west, thus producing the leads we could see. But, I must not worry my readers with too minute descriptions of the intricacies of ice interpretation and the deduction of Arctic evidence. It has been my privilege to gain experience in these matters and it was now my privilege to make use of the experience gained.

For about two hundred miles we crossed this old type floe. There were a few breaks in it here and there; perhaps never more than thirty or forty miles without a lead of some sort. By this time the wind at our altitude had swung to the northeast, but was very light and interfered very little with our speed, which was about one hundred and eight miles an hour over the ice. At the northern edge of that old-type floe we came to many leads and much young ice. Then the wind, in a short space of time, changed rapidly through east, southeast to south and then southwest.

It is probable, though not necessarily positive, that the thick old conditions were the result of the peculiarities of the air-currents in that vicinity. The ice conditions indicated active, frequent changes in the air and the directional movement of the old ice seemed to be restricted in its drift by converging currents of wind and water. It might be this ice accumulation is the result of snow in a comparatively calm zone, in which temperatures varied frequently. For, roughly estimated, two hundred miles after passing the old ice we crossed young ice, leads and ordinary pack such as is common on the edge of the Arctic Seas—where winds are variable and strong and sea currents forceful. By the look of the ridges on the ice in that area the drift and pressure had been alternately east and west with some pressure from all directions. Next we came to old heavy, ridged ice again and almost at the same time a cloud bank.

An hour or so before, I had watched with interest the sky behind us darkening. High in the air over an area that had been beneath a clear canopy when we passed, long stratus clouds had formed. First scarcely visible, then darkening, the cloud bank we were rapidly approaching announced its presence by a peculiar greyness above the horizon. If the air is calm right to the limit of vision, the sky seen from the altitude at which we were flying touches the distant earth-rim in almost steely blueness. The cloud bank we crossed over was probably the result of a comparative calm between winds in the vicinity at that time.

When I observed the drift just before coming to the clouds, it was to the northeast, but judging from the manner in which the low crests drooped, the wind had died down somewhat on the upper surface of the clouds. The main body of cloud seemed stationary, but it is not possible to be positive of cloud movement from an airplane.

CHAPTER VIII

NO LAND SEEN

MEETING low cloud at that interesting point of the journey was exasperating. Land in that particular vicinity would best serve our meteorological plans—enabling us to complete a ring of stations on fixed points almost equidistant in longitude and at about eighty degrees North Latitude. My great desire had been to find an island at that point and when we came there the surface was cloud-ridden.

What lies beneath that hundred and twenty mile belt of cloud is still a secret. Naturally, we saw glimpses of the ice a few miles at each side of the clouded area and when the surface beneath us cleared it was seen to be old heavy pack. I should say that the distance obscured from view where land might have been was not greater than eighty miles. The type of cloud which covered it was not conspicuously land-cloud, but more in the nature of cloud waves I have observed above sea and pack-ice, but since the clouds were too low for us to go beneath them, we cannot be sure that they did not cover low land.

When we again saw the ice clearly it was broken with much light pressure. The leads that day were east and west; the snowdrifts mainly northwest-southeast, but the ridges showed that the wind and pressure had been at times from all directions. Soon we were in an area where land-fast ice had been reported. The conditions we observed might easily lead one with a limited vision—all that could be seen, for instance, from the ground on a foggy day—to think this ice was on solid land either above sea level or resting on a shallow sounding.

We were flying at an altitude of three thousand feet. The rounded hummocks topped with clear ice glistened in the sun. It might readily have been mistaken for glacier ice, but I have seen much old, so called paleocrystic sea-borne ice with rounded hummocks topped with clear ice and that beneath us resembled such ice in all respects. Besides, while there was no open water within sight, many cracks in the surface gave me the impression that there had been open leads but a few weeks before. These ice-covered cracks ran irregularly east and west. The snowdrifts were north and south, formed mostly when the wind was from the west. We saw no great pressure ridges such as those usually found near land-fast ice. Perhaps that old ice rests on terra firma and is stationary but my decision at the time—judging from the facts just mentioned—was that it was floating. After carefully considering my notes and turning over memories of the flight I have no inclination to reverse my judgment.

The wind, as we crossed the old ice, was behind us in the direction from which we had come. We had apparently travelled out of the edge of a storm, crossed a calm belt, met variable airs, and had now entered another storm system that was evidently centering about the north of Grant Land. If we could avoid the heart of the storm, swinging on its circling rim, we should no doubt be aided by the wind.

Not long after crossing the old polished ice masses we came to ordinary pack, pretty well broken up with ridges but showing open water in only very small cracks here and there. The snow drifts were again northwest-southeast, formed mostly by northwest wind. From there to the neighborhood of Grant Land the winds had been variable throughout the season. The ice was ridged and pressed, the ridges forming rough squares giving the whole surface under view the general appearance of a huge chessboard.

We had been in the air eleven hours. It was past midnight local time but the sun—now almost due north—had been well above the horizon all of the time, yet for an hour or so it had been almost impossible to get even a reasonably accurate sextant observation, probably because of the refraction. My sights of the sun would differ so greatly as to vary its position by two degrees. It was almost beyond me as we sped along to keep the sun centered on the bubble of my sextant; I had to take many readings and take their mean. This difficulty did not present itself earlier in the day nor did it have to be contended with later when the sun was higher above the horizon. Around midnight from an altitude of three thousand feet we observed with the naked eye the dull red orb dance and skip like the mast-light of a distant ship rising and falling with the waves.

My attention was riveted to the ice-area north of us. It was in that neighborhood Dr. Cook claimed to have seen land. Far to the north between the sun and the horizon a greyish belt that appeared to me like thin, slow moving cloud, stretched like a silken scarf in the wind, but beneath it I could see a clear-cut horizon. If there was land beneath that cloud belt it was low, with a level surface. We felt certain then and believe now that no mountainous land exists between Grant Land and the North Pole. Still, humans are prone to err and we state only what appeared to us to be the conditions for a hundred miles or so either side of our course.

About this time Eielson, who could see the gas gauges and the tachometer which I could not, handed me a note reading: "Engine been turning about sixteen fifty. We are using approximately eighteen gallons an hour. Now about forty gallons left in wing tanks. Oil temperature hundred and five." This showed that our gas consumption so far was high. We should soon be consuming less gas as our load was getting down to normal. By rough calculation I figured that if we could get the consumption down to even twelve gallons an hour on the last quarter of the journey we should have enough to complete twenty hours' flying. We were averaging more than a hundred miles an hour over the ice. The distance over our course without deviation was about twenty-two hundred miles.

We had see-sawed over the clouds and we would probably see-saw again. We had also, from my observations, swung a little to the right on one leg of our journey and a little too much to the left on the next leg. It was not possible to keep accurate within a mile or so. I felt certain that if my interpretation of the meteorological conditions were right that we should have no violent head winds and that we could make it, but I knew it would mean piloting with strict attention to the job and most careful navigation.

I was confident in the comparative accuracy of navigation so far and was cheered by the fact that we were obviously over comparatively near-shore ice. By near-shore I mean within a hundred miles or so of shore. It is not difficult to differentiate between ice frequently on the move, pressed by the winds against the stubborn resistance of shallow water and the ice far off shore. Ahead high clouds of a nature observed only in the neighborhood of land, rose to considerable heights. Far, far away in the very distant eastern sky, pillars of high storm clouds hung like wraiths under the pale blue zenith. They were perhaps 150 or 200 miles away and seen only with the aid of clear high atmosphere and the advantage of six thousand feet altitude above the ice. Beneath these vaporous pillars was a greyish white darkening toward the horizon. From North and South long, grey stratus clouds streaked towards the storm center.

I was then certain of the Greenland storm and as certain also of a following wind for many miles. We might have swung northward to clear the high clouds which barred the way on a direct course, but it had been my hope to check absolutely our position by actually sighting Grant Land in the distance. With the cloud interference, a distant view was not to be had and when Eielson, to avoid a towering cloud mass, swung to the South I acquiesced. There was no real reason for this move as we could be at no point other than north of Grant Land. The clouds spoke of the mountains they covered, but it is only human to want the assurance of actual vision. I wanted to see rocks and soil.

To the South the clouds rose steeply, higher and higher. Eielson swung more to the right to avoid them and I hurriedly passed him a note: "You must not go west of south. Turn east or north if necessary to avoid cloud." Faithfully Ben banked the ship and swung into the North.

Vision ahead was bad. We ploughed through several cloud banks. I was hastily writing a note to inform Eielson of my estimate of the exact position, and to say that we could not afford to go into the cloud to look for Grant Land and suggest that he swing due north to clear the cloud when I heard him shout. I looked out of the window and saw slightly to the right and not far —perhaps less than twenty miles away—the rugged mountain tops of Grant Land piercing the clouds. It was a fleeting glimpse we had, but served to stir deep emotion in our hearts.

Without much ado Eielson took up his course from the penciled chart he had and in a few minutes shouted "Am I heading right?" "Okeh," I replied. Our course at that point was a little north of east; our swing to the South had put us slightly off our plotted route but not far enough to seriously affect the compass courses calculated before we left Point Barrow.

As we flew parallel to the coast of Grant Land the clouds were more broken. Frequently we could see towering, steep-sided masses showing darkly through the grey mists. Some glaciated surfaces and ice-caps were noticed and occasionally beneath us we caught a glimpse of the broken sea-ice. In what we believe to be the neighborhood of Cape Columbia we saw a level ice-foot which I took to be the ice-foot in front of the position where Peary had established his shore quarters just before striking out over the ice for the Pole. He had named the place Crane City after Mr. Zenas Crane, President of the Peary Club and the father of one of my friends and supporters in Los Angeles.

Our work of exploration was really over. We were cheered immeasurably by the fact that our machine had performed wonders, our engine faithful every moment. Calmly content, I reached for the thermos bottle, poured myself a cup of coffee, munched pemmican and biscuit and quickly summed up the situation.

We were above a small local storm. There was the Greenland storm on ahead on our right. The wind by observation was strong and behind us. If we kept on for an hour and the engine should give trouble we could hardly expect to return to Grant Land. Could we in that case fly as a cripple through the storm to land on Greenland? I knew from Peary's writing that the sea-ice north of Greenland was treacherous. Even if we found a safe landing field the walk to shore and habitation would be no sinecure. Because of the low temperature we were experiencing—in the cabin five degrees above zero;

outside forty below—and the wind direction that must go to make up the storm we could observe ahead, I felt sure that above the warmer surface conditions near Spitsbergen there would be cloud, perhaps violent storm.

CHAPTER IX

EIELSON WILLINGLY TAKES A CHANCE

IT was between one and two A.M. Barrow time, eight A. M. local time and I had not eaten since leaving Fred Hopson's kitchen eighteen hours before, but I interrupted my breakfast to write Eielson a note: "There are two courses open," it said. "We are above storm now. Down there we can land and wait until it's over. Can we get off again? If we go on we will meet storm at Spitsbergen and perhaps never find the land. Do you wish to land now?"

Ben with his stolid courage and calm considering mind wriggled in his seat. I could see a few inches of his shoulders above the gas tanks, his head being hidden by the wing. In less than a minute he replied: "I'm willing to go on and chance it." That accorded with my desire.

We had been thirteen hours in the air, long enough to be tired and cramped. The gas consumption had been more than we expected during the early part of the trip. There would undoubtedly be many miles of open water to cross at the extreme end of our journey. On the other hand there was a fine landing field below. In case of accident we knew that we could support ourselves in northern Grant Land. If we could not rise again in the air we could walk with more or less ease and comfort to the Canadian Northwest Mounted Police Station on Bache Peninsula which lies opposite Etah. We might then return to civilization in the Autumn with some vessel, but a true flying man sticks to his ship as does a sailor.

It would have grieved us more than enough to have wrecked our plane or left it behind. We had experienced that feeling of loss last year when compelled to leave the Stinson biplane for want of gas. I was willing to trust Eielson's skill as pilot in bad weather; he was willing to trust my navigation and we both had confidence in the men who had produced our equipment and in the quality of our gas and oil, so we kept our course without faltering.

Our experience last year in making three forced landings on the Arctic pack-ice far from shore to the north of Alaska and Siberia proved beyond doubt that, if needs be, one can land an airplane on the pack-ice and with a reasonable load take off again. We had seen many fine landing fields between Alaska and Grant Land but on the Greenland side of the Arctic Ocean favorable sites for landing on the ice were less frequent.

As we swung clear of clouded Grant Land we saw what Peary named *The Big Lead.* It stretched from a few miles north of the neighborhood of Cape Columbia toward Greenland until lost from view in the distant haze.

As we passed onward and north of Greenland the ice below us was much fractured. Much of the area was covered with ice too thin to land on and sledging travel thereabout, on the day we passed, would have been impossible. Not long after clearing the clouds near Grant Land the snow drifts showed the wind to have been variable throughout the season. North of Grant Land the wind had been frequently if not constantly from the North or slightly northeast. Our course was somewhat north of east and as we gained a more northerly latitude we slipped from the edge of the Greenland wind storm into still-cold, forty-eight below zero weather. For the first time during the flight my feet and hands were slightly chilled, but not cold. The oil temperature in the engine decreased to about sixty degrees Fahrenheit and from time to time Eielson had to climb the machine steeply or advance the throttle in order to increase the temperature of the engine.

Soon our course trended south of east and as we approached Latitude eighty-four from the North, we again came within the influence of the wind. Southward and more south our flight continued and as we swung in that direction the wind swung also, speeding us on our way. Three hours after leaving Grant Land one lone peak on the most northerly point of Greenland showed dimly in the cloud tops far to the south-by-west.

I was now positive that the low temperature and the high northwest wind would lead to trouble where it met the warmer air near Spitsbergen. Already on the far horizon we could see the ashen greyness that, when seen from a distance, indicates high Arctic winds and storms. But the North Wind had us in its paw and, as Peary said of his return trip from the Pole, we were sliding down the North Pole Hill in fine shape.

The edge of the Greenland storm and the cloudy conditions near Spitsbergen seemed to meet in the far South but for a couple of hundred miles our way was clear. Then we could see before us high, curling, cumulus clouds rising to heights even greater than our now lightly loaded plane could reach. As we approached the clouds Eielson climbed the machine steadily up, up to seven, eight thousand feet and the clouds were still high above us. It was useless. We could not hope to get above them and if we were to conserve our gasoline it was not advisable to go any higher. We must thread our way through the cloud lanes—and keep our course as best we could.

From my cockpit the sun, which had swung steadily on our left until after passing Grant Land, was now obscured by the right wing of the plane. Just before entering the clouds I asked Eielson to vary from the course for a moment while I made an observation to locate our position as nearly as possible.

The sun at the time was about sixteen degrees above the horizon. By coming East we had met his Solar Majesty half way round the world. Several sights gave me the needed information. We were approximately two hundred miles northwest true from Spitsbergen and slightly east of our course. The wind from a little west of north was drifting us eastward but I was not inclined to alter my calculated compass course at that moment. There would be no telling the force and direction of the wind when we reached the clouds and I considered it wiser to be too far east over land than too far west over the Greenland sea from where we would have had to fight our way in a cross wind to make the coast of Spitsbergen.

We made sure that all the gas the pumps would carry was in the top tanks. It appeared that we had gas to last four hours at least and perhaps more. At an altitude of eight thousand feet we entered the cloudy area. Eielson selected the lanes between the feathery masses, cleverly compensating for his deviation without my aid. The air was turbulent and unstable. At rare intervals we saw in the dim distance beneath us dark streaks of water between scattered ice. For an hour and a half we flew through cloud lanes, very occasionally seeing patches of almost ice-free water, but these glimpses were too fleeting to enable us to get an observation for drift and speed. We could see the sun at times and at others it was hidden behind high clouds but these infrequent flashes enabled us to check our compass course.

As one would naturally assume, our compass during that period was less reliable than at any other time of the flight. Frequent and sudden changes to avoid cloud formations and to follow lanes swung our compass back and forth, giving it no time to steady. To keep our course we had to rely on our sense of direction, a study of the tilt of the cloud tops and occasional sights of the sun, rather than place any reliance on the compass.

We figured that if the wind had held in our favor—and we believed that it had—we must be nearing the mountains at the north end of Spitsbergen. But even the highest mountain tops would be covered with cloud if there the clouds continued as high as those among which we were flying. The clouds also appeared to extend down almost to the water so that we dared not go beneath them for fear of running directly into the mountains.

Our engine had functioned splendidly all the way, but it was reaching the end of a gruelling trip and the gas in the tanks was getting low. Now in the moisture laden atmosphere there was greater danger that the carburetion of gas and air might fail and let us down into the icy water. If we turned east to make sure of being over land we would have—assuming we could make a safe landing in the mountains—a most tedious journey over deep snow and glaciers.

Southward the clouds seemed lower and we turned in that direction hoping to spy a mountain peak by which to locate our exact position. Soon we were rewarded by the appearance beneath us of two sharp, needle-pointed peaks. Down we spun through the break in the clouds for a closer view. Once getting a sight of land we thought it might be possible to fly low and follow its contours.

The air was turbulent above the clouds; beneath them it was boisterous. Our now almost empty plane was tossed like a cork on a stormy sea. Loose things in the cabin tumbled and rattled. With nothing to get a grip on I tumbled too, if I didn't rattle.

Right then Eielson's valuable training and cool skill demonstrated their worth. With the plane nosed down and with engine full on she bucked like a broncho but Eielson, never losing the upper hand, held and guided her splendidly around the rugged mountain tops. We came down to within a few feet of the ice-strewn water near the coast where the surface wind was furious and the salt spray, whipped from the sea, filled the air. Over the land the snow drifted high and thick, precluding a judgment of distance.

A patch of smooth, snow-covered land was passed in an instant's flash and dead ahead loomed a mountain. With an adroit swerve of the machine Eielson avoided it by a narrow margin. We could see that it would be dangerous to follow the coast too closely so we swung broadside to the wind and crabbed our way out to sea. But the sea held for us no haven of rest or safety unless, forsooth, it should be a long, long rest. It soon became evident that what we had missed was a small mountainous island, also that it was useless for us to remain out over the water. Back we turned toward the land only to be rewarned by the steep mountains. We were like an imprisoned bird beating against a window pane.

We knew we were running short of gas and must land soon or be without enough to move again if we came down. We had no choice but to endeavor to relocate that one smooth patch of white of which we had caught but a glimpse. The wind-shield before Eielson was almost totally obscured with snow and frozen oil; his vision restricted to the little he could see through the small open windows and by looking first on one side and then the other. The windows of the cabin, flush with the fuselage, were clear of snow, providing me with a fairly clear outlook.

We hawked about this way and that. I passed note after note to Eielson as fast as I could write them:

"Turn right."

"Now to the left."

"A bit more."

"No, we have passed it."

"Turn back."

"Turn back."

"Keep as close to the land as possible."

"There it is on our right."

Eielson had little time to read my notes. Indeed, I marvelled that he could even spare time to grasp them, let alone follow their meaning, so busy he must have been with the controls of the machine.

We were past the place I meant almost as he saw it so he swung once more out to sea in a narrow circle and heading into the wind came low into the teeth of the snow drift. It was a right anxious moment for both of us. My face was hard against the window pane as I tried to learn if the surface was smooth or covered with broken ice. It was impossible for Eielson to see but with steady nerve braced for all eventualities he levelled the ship and lowered her gently until lost in the swirling snow.

We came smoothly to rest. Because of the high wind our ground speed, gliding with engine dead, was necessarily slow, perhaps twenty or thirty miles an hour. Even on the ground we could not judge accurately the force of the wind because of the blinding snow but it must have been unusually high and was such that the machine moved scarcely thirty feet beyond where the skis first touched. Once on the ground we could see no more than a few feet to each side of the machine. I flung the engine covers and an empty oil can from the cabin and struggled forward to empty the oil tanks before the oil should freeze.

"Open the tap," I shouted to Eielson and held the can under the drain-pipe but nothing happened. Again I shouted my request as loudly as possible. But Eielson was temporarily stone deaf as the result of the constant throb of the engine. He could not hear a word and only when by signs was I able to make him understand, the oil flowed. The wind continued with hurricane force and high drifts soon formed. We stamped the snow about the skis so that it would freeze and prevent the ship from swinging or turning over.

Promptly as could be managed we threw the covers over the engine; first the one of canvas, then the waterproof and tied them tightly.

We could convey our meaning to each other only by signs at first but, as had been the case last year when we had fallen through a dark, raging blizzard five thousand feet to the pack-ice, there was nothing we needed to discuss immediately. Silently we climbed into the cabin of the machine and brushed the snow from our clothing. "Thank God the machine's safe," I screamed in Eielson's ear. He nodded solemnly. The minds and hearts of both of us were too full of thankfulness for conversation even if hearing had been easy.

The plane rocked and trembled in the gusty wind. I reached for the remainder of the lunch provided for our use during the flight and we munched dry biscuit, chocolate and pemmican. There was still in my thermos bottle enough hot coffee for a swallow each. Ben had a few cigarettes in his pocket and after a smoke we settled down to rest. Neither of us, I think, was physically tired but the strain of the last two hours had told on our nervous systems. Sleep for a while was impossible.

It is interesting now, some time after the event, to compare our mental state at that time with what our attitude had been the foregoing year when after our forced landing we faced a long walk home. Last year in our machine when we were plugging wearily onward hoping our gas would last until we reached our base or the land at least, our engine had suddenly quit. For twenty minutes we floated down through utter darkness, a grey forbidding darkness. Not black like a winter's night but a nerve-racking, sense-dulling density. Beneath us lay what? Rough ice we knew and perhaps a lane of open water. Injury, minor or fatal, seemed imminent but we were resigned—helpless in the hands of our Maker, his to dispose of without effort on our part. There was nothing we might do to help ourselves.

But for the landing we made this year on Spitsbergen, we had to fight. Fight every inch of the way, anxious, uncertain, never quite helpless but ever against tremendous odds. We had, as we sat in the plane, reached a position of safety not only for ourselves but for our plane. I cannot say which year, this or last, our prayer of gratitude was more earnest. Both times it was sincere.

CHAPTER X

FIVE DAYS ON DEAD MAN'S ISLAND

OUR coast to coast, non-stop flight had been ended. We had been twenty hours and twenty minutes in the air. It was less than half an hour since we first sighted the twin mountain peaks yet it seemed like an eternity to us. After a short rest Eielson began to regain his hearing and we commenced to figure out our exact position. From dead reckoning we reasoned we should be in the neighborhood of Kings Bay but the island we had seen in flight was confusing. There was no such island marked near Kings Bay on our chart. True, the chart we had was on a small scale, twenty miles to the inch, and small islands may not have been included in the drawing. The snow covered mountains gave us no clue as to position for they were not indicated on our chart. There was nothing to help us until the sun shone and even then our method of navigation was not considered to be accurate within ten or fifteen miles.

We wondered how much gas we had left. Eielson felt sure he had noticed on the gauge that it had registered at least twenty. It was too stormy to go out and see. If Eielson's estimate was correct there was no real need, for we were on the west coast of Spitsbergen and either Kings Bay or Green Harbour must be within a hundred miles. Twenty gallons of gas would get us there.

We talked of the joy we knew our success would afford Allan Loughead, Jack Northrup, the designer, and each individual workman in the factory. They had labored faithfully and well and what is more with most obliging and splendid consideration for our least desire. We knew that the Wright Company would be pleased because our halting successes and failures during the previous years had been no great achievement for their engines. Every one of our mutual friends was recalled one by one and through our minds flitted silent messages to our individual friends. We had flown just about half way around the world in one hop. We tried to make it seem real that at Barrow Fred Hopson and Charlie Brower, whom we had left twenty hours before, would be eating breakfast while the inhabitants of Spitsbergen would be having their evening meal.

In an hour or so our strained nerves relaxed and we slept. When we awakened the snow was still drifting but more gently. We felt that we had taken a Rip Van Winkle sleep but our watches showed that scarcely five hours had elapsed since our landing. The midnight sun struggled valiantly enough to promise that later in the day the clouds would be dispersed. We rested and slept again.

When we next opened our eyes it was to find the sun clear in the East and well above the mountains. With the bubble sextant I got a fairly reliable altitude of the sun. Our calculations and drawings on the chart placed us somewhere on a line that exactly followed the west coast of Spitsbergen. After a few hours, when the sun had swung to the South, another observation for altitude would enable us to draw another line on the chart and where those two lines met would be our approximate position.

The snow rolled along the ground but was not drifting high. We jumped from the machine to wander around and take stock of our surroundings but a few steps from the plane told us that without snowshoes or skis we would not be going far. Each step let us down to our knees in the soft snow.

As we unfastened the skis from the cabin wall I was glad I had not yielded to my temptation at Barrow to reduce weight by leaving one pair behind. Looking north and towards the sea we saw a small round knoll a quarter of a mile away and upon it stood a surveyor's triangular beacon of sawed wood, evidently placed as a guide to masters of ships that might pass along the coast. We snowshoed over and examined these evidences of human handiwork but they offered no clue to our position. Not a line or scratch was found on any of the timber. I had brought binoculars along and scanned the mountains and valleys to the east of us. Dancing above the low snowdrift were many dark objects quivering, lengthening and widening under mirage influence.

Far in the distance, across a bay or strait, we did not know which, we could see what looked like the houses of a village but their situation in no wise resembled the conditions at Kings Bay, as we remembered it from an indifferent photograph. Neither of us had seen a picture of or knew what the conditions were at Green Harbour. Several times I turned to look at the dark objects floating as it were on dancing haze. Too often had I been fooled by mirages in the Arctic and other places to be concerned about these dancing forms. Under just such conditions I had seen palaces, ships, palm trees and giant cities outlined above treeless, sandy plains or Arctic wastes. A mirage will throw up shadows resembling any known physical thing depending upon the imagination of the observer. We could not believe we had been lucky enough to have come blindly to within a few miles of a city and there were no cities on Spitsbergen. We turned away from the mocking shadows.

Just outside of us in the sea stood a saddle backed high island and further north the great peaks of another large island, the extent of which we could not see. The general direction of the coast gave us no hint. It is the same from the north to south of Spitsbergen. The only islands we found marked on our charts except Prince Charles Foreland were Amsterdam and Danes Island at the north end of Spitsbergen. It must be that we were near Danes Island sixty miles north of Kings Bay. That didn't seem reasonable for we estimated that we had followed the coast southward for a matter of forty or fifty miles.

I walked to the foot of a mountain a few miles eastward and saw that beyond it lay either a channel or deep fiord, extending for many miles. I could see no end to the open water. There was little time for observation. The snow, still drifting, was beginning to swirl high again and I must hasten back and get a second sight and see where that would place us. I was so dead tired from my walk and the previous day's exertion that my second observation of the sun was probably indifferent. They placed us on Spitsbergen, somewhere opposite the approximate middle of Prince Charles Foreland—between Kings Bay and Green Harbour. It seemed, although we had followed along the coast, we could not have come so far. The morrow might be fine and a definite position within fifteen or twenty miles established. There was little doubt that if we had fuel for an hour or an hour and a half, we could reach some habitation.

The wind had swung with rapid strides from the north through east to southeast and it was now blowing a hurricane from that direction. The snow that had whisked by us as we landed the day before was now scurrying back in the direction from which it came.

All the next day the southerly wind continued, to later swing suddenly north again and beat down with a fury bringing icy chill. Our thermometers had fallen to the floor and broken and we could not register the temperature except by feel. Until we knew exactly how much gas we had we could not afford to burn gasoline for fuel, so in a cup we burned some alcohol and melted snow for drinking purposes. We could have nothing hot in the plane, for the same principle would apply as regards the snow-house or tent. If we raised the temperature in the cabin the hoar-frost on its walls would make it uncomfortable. Another reason was that we did not need to heat our food. We had learned last year that we could manage very well with cold water, dry biscuit, chocolate and pemmican.

But there were on the beach some logs of drift wood I had seen while reconnoitering, so the next day—although the snow whisked about and visibility did not exceed a few hundred yards—we ventured forth; hitched ourselves to logs of drift wood and dragged them laboriously through soft snow to a little rock exposure near the plane. It was useless to attempt to build a fire outside that day, but the wood we thought would come in handy to warm the oil and give a hot drink of chocolate, before we started out again.

Next day in a spell of calm weather, though still in snow drift, we tried to build a fire only to discover that the wood we had strained to get was so salt and sodden it refused to burn even after being saturated with the old engine oil we had drained from the tanks after landing. An hour's effort produced only enough melted snow to miss quite filling our two thermos bottles with lukewarm water. For further liquid we must resort to our small store of alcohol. The knowledge of this aggravated our thirst, but expending little energy, lying cosy in the cabin—our feet well covered in our sleeping bags and our arms drawn inside our fur shirts—we needed little to eat or drink. The waiting was tiresome and we were restless.

We were somewhat anxious about the actual amount of gasoline. With the tail of the machine on the ground the gauges were not precise. The snow prevented our draining the tanks and measuring the gas in an empty five gallon can we carried. We smoked the cigarettes I had provided for an occasion such as this. We had two cigars and one day we divided one cigar and each smoked one half. Patiently we waited for the weather to clear.

During a lull on Friday morning we measured the gasoline, running it through the carburetor to be sure that all we measured would reach the engine if necessary. Only five gallons ran from the two starboard tanks. There would be about the same quantity in the port wing tanks, for they were connected. Yes! Another five gallons were recovered, but our spirits sank, for we believed we had pumped the cabin tanks bone dry and ten gallons, if we had trouble taking off, would barely take us into the air.

We were miserably down heartened and dreaded to rip the seals from the dump valves of the cabin tanks. But we must drain every drop! Warily we set the can beneath and I pulled the rip cord. Much to our astonishment a full stream of gasoline came forth. Through a half inch opening the five gallon can was soon filled and there was more to come. Fifteen gallons. That amount was worth while, but how were we to block the pipe while the five gallons of gas we had extracted was poured into the upper tanks? We had but one can and nothing would stop the flow except some soft obstruction fitting snugly against the pipe. The only soft thing available was my hand. I slipped my mitten free and shoved my palm against the pipe. Gasoline ran down my shirt sleeve and evaporating decreased the temperature. It seems as if my hand would freeze solid before Eielson had time to drain the can and place it once more under the opening. We could not afford to lose the gasoline. Eielson made all possible speed, but I suffered excruciating pain and frost bite before the can was replaced. Less than half a gallon more came from the tank. Still, it was worth it. I thawed out my hand and arm and the same procedure was followed on the other cabin tank. We measured in all more than twenty gallons into the top wing tanks. We were confidently happy, twenty gallons would take us anywhere we wanted to go in Spitsbergen.

We climbed into the cabin, had a good meal of pemmican and raisins and turned over for a comfortable sleep. We hoped the weather would clear by morning and we could get under way.

While we were sleeping the wind grew stronger and the rocking of the plane wakened me, but the storm was waning and I felt it could not last much longer. All Friday afternoon we tramped back and forth on the snow in front of the drifts that had formed immediately before the machine. We first broke down the snow with our boots, then slid back and forth on snow shoes until we had a hard runway nearly one hundred feet long. The wind blew strongly from the north throughout the afternoon and night and the drift was blinding, but it bowled along over the pathway we had made, leaving no ridges there, but polishing the surface.

We had sighted Spitsbergen 6:15 P.M., local time, on Monday, April 17th, and landed twenty minutes later. It was not until Saturday at three A. M. that the weather was again fit for flying. At that hour we climbed from the machine and cut and shoveled snowdrifts for six hours to clear the machine. At the head of the runway we made a downhill start. We planned, if we had no time for more accurate sights, to rise in the air and from an altitude observe the coast, definitely fix our position and then choose our course.

CHAPTER XI

FORLORN ON THE ICE

WE placed the stove beneath the engine. It was difficult to do this in a wind, but once in place, it gave no trouble. I heated the oil on the Primus stove in the cabin. We were soon to find that our decision not to land on the pack-ice with half a load had been very wise. The tanks now held only twenty gallons of gasoline. With that little for a load and two of us aboard the machine would not budge an inch. When I got out and pushed the tail she started fine, but to climb in as she moved was not simple. It was now that we felt keenly the loss of the block and tackle taken from our equipment at Fairbanks. It had been designed for just such an emergency. With the loose end of a bight in one hand and hauling on the free end of the tackle I could have, while in the cabin, exerted the strength of four men, and when the machine moved, drawn the block and tackle into the cabin for further use. But that part of the equipment—invaluable where two men must do the work—was not with us and we had to make-shift without it.

Because the machine would not move with the two of us in it, I needs must get out and push on the tail. As she started I clung to the step and tried to climb in, but soon fell off. Eielson, unable to see behind, thought I was in the machine and took off. When he turned with the machine he saw me forlorn on the ice. He circled and landed.

I slung out the rope ladder I had prepared in lieu of the block and tackle, but I wasn't too sure that my ability as a sailor would enable me to gain the cockpit with the aid of a dangling rope in that low temperature. To cling to a rope and scramble into a plane in warm weather is one thing. To attempt the feat in a temperature below zero on a plane travelling at the rate of a hundred miles an hour is quite another. I hadn't the slightest desire to dangle like a puppet until I froze and then drop like a plummet to destruction. However, I decided to try it and to hang on at all costs.

We started again and as the machine gathered speed I climbed to the tail and from there struggled desperately to gain the cockpit. I had thrown off my mittens in order to get a good grip of the ladder. My hands were soon numbed with the cold and I could not readily grip the rope, so I grabbed hold of it with my teeth. A foolish thing to do, perhaps, but it seemed imperative that I cling to the machine. We had gathered much speed and Eielson, feeling the weight still on the tail, thought I was safe and took off. Just before he left the ground I realized that my chance of gaining the cockpit in the air was much too small and I slithered from the smooth, shiny fuselage, being struck by the tail and thrown to the snow. It was fortunate for me that the snow was soft. I was half buried and partially stunned from the fall. When the snow was freed from my eyes and mouth I found that I had escaped other injury, but every front tooth in my mouth was loose. Whether from the impact of the fall or from the grip on the rope I was not sure, but I think now it was the result of holding onto the rope.

Eielson, in the air, discovered that I was still on the ground, so he circled and landed again. The snow was by no means perfectly smooth and the wind was across the ridges, making it necessary to land at right angles to them. I trembled for fear the landing gear or the skis might break. I was directly before the machine as she landed. The sight appalled me. It struck the snow and bounded over ridges like a frightened deer. The skis, slung and kept in tension with rubber cords, bounced and wobbled almost like the arms of an octopus. They wouldn't stand many more landings on snow like that.

It was hard to know just what to do. I was still a little winded from my fall and dressed as I was in my flying clothes during my strenuous efforts, I was wet almost through with perspiration.

We had been running the engine for almost an hour and had used nearly half of our precious gasoline. If we could not get off the next time I would take the tent, a rifle and some food from the plane and Eielson would go on alone, either to Kings Bay or Green Harbour, coming back with a boat for me at some later date.

That would have been a desperate move. It would have been unwise for a party of two, situated as we were, to split. There was no forecasting what might become of either of us, but ours seemed to be a desperate plight. We could possibly have found our way to the mainland and along the coast to some habitation, but that would have entailed leaving the machine behind. Perhaps, only perhaps, would we be able to pick it up later in the season. We might have waited there with the machine on the off chance that a boat would come to our rescue. Sealing boats would occasionally pass that way, but busy as they are about their business they might easily fail to see our signals.

The third time might be the charm. I would hook one leg in the cockpit-opening and with my foot against the fuselage push with all my strength on the log of driftwood we had found and thus try to move the tail. In order to get a better start we lifted the tail onto a block of snow, putting the machine in almost flying position. Then I fixed myself and the stick, gave Eielson the signal and he shoved the throttle wide open.

For a full minute we hung. I pushed and strained every muscle. The tail swayed the inch or so allowed by the play in the skis, but seemingly would move no further. Suddenly, with a slight lurch, she was free. I dropped the log and with one leg in the cockpit and with hands on its open rim I dragged myself up and regardless of bruises tumbled to the bottom of the cabin. Utterly exhausted, I was unable to answer Eielson's shout of inquiry, but he took off hoping I was safe. Before he had time to circle I had let him know that I was aboard.

I wanted as soon as possible to get a general view of our position, but the warmth of my body caused hoar-frost to cling to and obscure the windows. It was useless to try to clean them and it was essential for me to see where we were and agree upon a course to follow. Just as I stuck my head through the open cockpit for this view, I heard Eielson shout: "What's that over in the bay to the left?"

We had rounded the high point near which we had been and were by that time at an altitude of almost three thousand feet. I looked to the left and through wind-born tears saw two tall radio masts in the distant group of houses. It could not be Kings Bay. The shape and dimensions of the fiord disproved that. I ducked into the cabin and wrote a note to Eielson: "Must be Green Harbour. Go over and land where you think best."

We crossed over about five miles of open water, swung across a mountain top and then planed down close to the ice. The snow surface on the harbor-ice was smooth and we flew beyond the radio masts for a mile passing the immense surface machinery of a coal mine. Then circling over the ice we came in to land at the foot of the radio masts. Our flight from our base in Alaska to a town in Spitsbergen was ended.

CHAPTER XII

HAIL AND FAREWELL

IT was about half after ten local time when we landed. We saw few signs of active life but two Norwegian flags floating on the breeze assured us that we would soon be among friends. A small white dog frisked on a snow bank and others, jet black, were romping in a yard. Before I had time to climb from the cockpit we could see three or four men, shod with skis, coming down the slope toward us. They might have thought it strange that we should not move to greet them, but our first duty was to the plane and engine which had brought us safely over more than two thousand miles of Arctic ice; which had been our shelter from a five days' blinding storm and which now stood—so far as we could see—as perfect as the day it left its birthplace. I had the covers out and the engine sheltered and was draining the oil when the men arrived.

They were the same fine Scandinavian type I had been accustomed to seeing on my visits to Norway and Denmark. A portly gentleman of soldierly bearing came forward to greet us with an old-world grace and charm of manner. He was Th. Bowitz Ihlen, manager of the Svalbard Government Radio. With him came Herr Ludvig Varming, a Danish resident-representative of many interests in Spitsbergen, and Paul Rierson, Emil Johansen—telegraphers. Closely following them came Frohen Gunvor Stavseth, a beautiful Norwegian girl from Harstad, North Norway. We were surprised to learn that there were ladies on Spitsbergen. Every one of these people spoke very excellent English and I answered to the best of my ability. There was a look of pleasant astonishment when Eielson, from the cockpit, greeted them in old Norse phrasing and accent with a slight American influence.

They were unquestionably hospitable—as all Scandinavians are inclined to be—but Eielson's Norwegian greeting gained us a real brotherly acceptance. Patiently and courteously they refrained from asking questions until we had tended our plane and then they said: "You must come with us to our quarters and make yourselves at home." The snow in Green Harbour was deep and soft and we were glad to make use of our snowshoes to walk even the short hundred yards to the radio station mess. Our new friends almost apologized for the condition of the snow. "It is the result of the bad weather we have had during the last five days," they explained. "Before that we could walk from one building to another without difficulty."

Presently we were comfortably seated in Manager Ihlen's sitting room sharing bountiful hospitality. Rare wines and liquors were offered. "Skaal." "Skaal to you. Your very best health and future success." A toast to our accomplishment must be drunk with every one on his feet. With an exhibit of true gentlemanly breeding they refrained from plying us with questions but we volunteered some information.

They informed us of the recent storm period. "Never before in my eleven years' residence in Spitsbergen," said Herr Ludvig Varming, "have I seen such weather in April. Snow and wind, wind and snow. It has been a period such as we are accustomed to experience during the equinoctial storms in March but never in April."

Then we learned how fortunate we were. At Green Harbour stands the Government Radio, communicating direct to Norway and operating

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CAPTAIN WILKINS AND LIEUTENANT EIELSON TELL CAPTAIN ALSAKAR OF THE *St. Svithim* HOW WELL PLEASED THEY ARE TO BE BACK IN CIVILIZATION

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ARRIVAL OF CAPTAIN WILKINS AND LIEUTENANT EIELSON AT BERGEN AFTER THE 1928 FLIGHT at that time of year between eight in the morning and nine at night. At Kings Bay the radio station, privately owned, operated at best intermittently and, alas, now not at all. On Sunday, when the blizzard in which we first landed broke, the radio operator at Kings Bay had lost his way in going home from the radio station and wandering in the blinding storm until exhausted, had frozen to death. We more fully appreciated how favored we had been to have escaped with our lives in such weather. An amateur, slowly pounding the key at Kings Bay, had given them the news but his skill was insufficient to cover the details. Had we landed at Kings Bay it would have been difficult to have communicated with the world for many days.

As it was we could have immediate communication. The whole radio station and its staff was at our convenience. At once Herr Ihlen most thoughtfully provided pen and paper. "You must surely have many telegrams to send. Please feel at liberty to attend to your affairs and call upon us for any assistance you may need." I promptly took advantage of his offer and wrote a few wires to our friends whom I knew would be waiting anxiously for news.

At Barrow, before we left I had made no attempt to communicate with the outside world. Perhaps I was remiss in this, but it would have been very inconvenient besides being likely to expose our radio set to injury. It would have meant carrying it back and forth each day from the plane to the hospital six miles away; installing it and on the off-chance, getting a message to somebody or other merely stating that we were having trouble with the take-off, uncertain when we could leave. Since that is all we could have said, it was scarcely worth the while. I doubted very much whether our signals in flight would be heard by any of our friends outside, though some amateur might have picked up a message if the apparatus worked.

To cover the situation as far as possible I left our receiving set at Barrow with Mr. Vincent, the school teacher. He had some knowledge of wireless telegraphy and promised to keep watch throughout the period of our flight. In that manner he would doubtless learn of our progress and in the event of trouble be able, some time in the future, to issue the information. It would not be possible for him to transmit radio messages from Barrow and his information would have to go by mail in the summer to the nearest telegraph station.

The generator for the radio set had functioned well at the start of the flight and for some time on. Later, I am not sure of the hour, its movements began to be erratic and although I had no definite way of knowing I felt reasonably sure our messages were not passing through the air. However, I manipulated the key tapping out some long and some short messages at twenty minutes to the hour, on the hour and sometimes at a quarter past the hour, on each hour during flight. When in the clouds near Spitsbergen I sent the last message which said: "Now within a hundred miles of Spitsbergen. We are in bad situation. Heavy clouds about us. Have two hours' gas but will not be able to see the land. All open water below." This message was repeated several times. In point of fact I was anxious for our safety at that time. Then as I was again repeating the message the two sharp mountain peaks came into view and I cut into the sentence with "Spitsbergen in sight. Spitsbergen in sight. We will make it."

Thereafter I was busy trying to keep my balance in the bucking plane and trying to discover our location and a landing field. This work occupied my attention so completely that I must confess I even forgot to wind in the radio aerial and it dragged beneath us as we landed. Happily, however, this neglect caused no damage. Later when we examined the radio generator we located the trouble. A bearing on one of the armatures had burned out and the armature was beating the permanent magnetic fields to powder. The filament side of the generator was working and that kept the tube illuminated but it is impossible to say just when the apparatus failed. When we hear from Mr. Vincent we will know.[1]

Since we had landed safely at Green Harbour there was no need for us to worry about the failure of our own wireless apparatus. We had a powerful Government Station at our disposal and soon the sparks were flying. Herr Ihlen graciously asked my permission to inform his chief of the Radio Service of our arrival. Permission, of course, was granted. "You will be sending a great deal of press matter?" Herr Ihlen suggested, but at that time I was doubtful. I had no definite arrangement with a news organization. Had I known it, there was even then a wire from the *New York Times* awaiting

[1] See appendix.

me at the telegraph office. With confidence in our success, the editor had addressed a message to me at Spitsbergen.

Further evidence of the noblemindedness of our hosts was the fact that—although both Herr Ihlen and Herr Ludvig Varming are authorized news correspondents—they refrained on the first day from taking even the fair advantage of transmitting the small, substantial bit of news they had gathered until I had read their messages and given my permission. After I had made satisfactory arrangements and sent my first story to the press they were, of course, at liberty to and were within their rights (even as they had been from the moment of our landing) to write as they liked. Such kind and gentlemanly treatment will never be forgotten.

The steward at the radio mess, Oscar Bergh, prepared steaming hot coffee for us; the first really hot drink we had had since leaving Alaska six days before. We thoroughly enjoyed the Norwegian delicacies set before us but that was not enough. We must accompany Herr Varming to his house and partake of his hospitality there. He had some special liqueur made according to a famous old Danish recipe and with that all must drink to our success and the success of future enterprise. Accompanied by our radio host we went to the house of Herr Varming. There we met his charming wife, a typical blonde, blue-eyed Scandinavian and their three children: a fine looking, well mannered boy of nine years or so; a dimpled little girl named Sos with flaxen hair and a heavenly smile, aged about three years and a struggling little tot born about six weeks before.

The charming manner and kind hospitality of these new friends was a pleasure to behold. Wonderful in its breadth and spontaneity it could not outdo but was quite equal to the treatment we had received from friends in America. However, the mannerisms were more after the fashion of my youthful experiences and after three years' absence from European customs, they charmed me.

We learned that the *Hobby*—which boat had carried Amundsen's planes in 1925 and which had helped Byrd at Kings Bay—was at Kings Bay discharging a cargo of supplies for Nobile. She was unfortunately fast in the ice but she might break loose at any moment. She would then be ready to proceed South and would call at Green Harbour on her way. We could probably put our plane on board without much difficulty when the ship would come to the edge of the harbor ice. We could taxi our machine to within a few feet of the *Hobby* and sling it on board just as it stood.

Returning to the living quarters used by the radio staff we found that the steward had most considerately arranged a room for our convenience. We had comfortable beds, a writing table, typewriter and paper; in fact, every accommodation we might have expected in a modern, first class hotel. Well— perhaps there was not a tiled bathroom adjoining, but the bathing question could be settled as it always is in an Arctic household in an Arctic winter.

Three hours after our arrival wires from our friends came to us. They and the world had learned of our safety and they and the world were pleased to let us know that they were pleased. As time went on congratulations came from the King of Norway; the Secretaries of State and War at Washington; from premiers, ambassadors and high commissioners; aero clubs and scientific bodies; from our true friend Dr. Bowman of the American Geographical Society; from other explorers, including Nansen, Stefansson and Roald Amundsen—who, of all men, most realized the nature of the work we had done.

And—what had we done? With perfect equipment—supplied by the Lockheed Aircraft Company of Los Angeles who built the plane; the Wright Aeronautical Company who built the engine; the Pioneer Instrument Company, whose skill in design provided most of the essential instruments; the generous financial aid and reliable products of the Richfield Oil Company, Los Angeles, whose gas we used; that of the Pennzoil Company also of Los Angeles whose remarkable oil served our engine—two men had covered twenty-two hundred miles of Arctic snow and ice; thirteen hundred miles of which had never before been seen by man.

Eighteen hundred miles of the way was traversed in clear sunshine. A little more than one hundred miles of cloud-covered ice in the center of the hitherto unknown region between Point Barrow and Greenland was the blot on an otherwise clean page of exploration. The clouds met in other latitudes were over well known ground and were only an interference because of their obstruction. We had carefully noted the trend of the drift of the ice and the direction of the snow drifts, which gave to us an idea of the movement of the air-currents near the surface throughout the season.

We had failed to find a suitable land mass on which to establish a meteorological station, but our observations show that it might be possible to establish that station on the floating ice.

We demonstrated that it is possible to find one's way in an airplane on a cross-longitude course in the Arctic regions—even when that course was half way around the world and lay over the area where compass declination is at its maximum.

Whatever else we may have accomplished through our efforts we will learn only as time goes on. Eielson and I have learned, at all events, the sincerity of friendship. The fullness of our appreciation for the generous aid of many men and women, without whose support and faith and loyalty, we could not have done even that which we have done, can never be expressed. We thank them all.

APPENDIX

Editor's Note—Since going to press the information mentioned on page 326 has arrived in this country in the form of a letter from Mr. Vincent, in which he gives a dramatic account of the exact messages received from Captain Wilkins during the latter's flight. The letter follows:

Barrow, Alaska, April 30, 1928.

Lura B. Shreck,
1370 Washington Street,
San Francisco.

Dear Madam—Captain Wilkins left with me his receiving set and made arrangements with me to listen in while he was making his flight. I am a radio enthusiast and was very glad of the privilege. He instructed me to write to you in case I was fortunate enough to get any of his messages. I expect that many other radio people listened in on the flight and you have doubtless had messages direct from the Captain since the flight, but I am going to send what I heard just the same, hoping that it will be of some use.

Captain Wilkins was very kind to me while he was here and the radio he left has cheered many lonely hours and brought the news of the world to our far North. This is the only favor I can do for him and I would appreciate it very much if you would send me a short line to let me know that you receive this letter all right.

The messages were very faint and I had the greatest difficulty taking them because they merged with other atmospheric noises. I wish I might have taken the entire messages, but the principal thing was to know that the plane was still in the air and that things were all right.

The following are the exact messages without any fixing up at all:

Sunday, April 15, 1928

4:00 P. M....one hour...nowhere clouds... right over the mts...skimming their tops.

5:00 P. M. KDZ KDZ KDZ Above the clouds now in lat 80 OK KDZ KDZ.

6:00 P.M. . . over . . . Clouds ahead. KDZ KDZ KDZ.

6:20 P. M. KDZ KDZ KDZ Clear now, but cold. . .but fog ahead. KDZ KDZ.

7:00 P. M. KDZ KDZ KDZ Are OK so far. Three hundred miles from Grant Land.

9:00 P. M. KDZ KDZ KDZ Clear. We are OK. KDZ Wilkins Arctic Expedition. One hundred miles from Grant Land, KDZ KDZ KDZ.

10:00 P.M. KDZ KDZ KDZ. . .clear but clouds ahead. KDZ KDZ KDZ.

11:00 P. M. KDZ KDZ KDZ Clouds. Stormy here, but we are not far from coast. Can't see it. . .fog. . .storm.

1:20 A. M. KDZ KDZ KDZ Wilkins Arctic Expedition . . . Greenland . . . storm . . .

2:00 A. M. . . .our tanks. . .

3:30 A. M. (Transmitter buzz faintly heard, but messages too weak to take.)

3:50 A. M. (Transmitter buzz gradually faded to silence.)

It was getting to be daylight here at the last and the strength of the messages faded very slowly. I could hear the buzz of the transmitter after the messages were too weak to take. I knew the buzz continued until 3:50, but could not be sure after that.

Since the last message, too faint to take, came exactly on the time he had arranged with me and because the fading was very gradual, I am quite confident that he reached his goal. He must have been very close. I sincerely hope that this information will be of value to you. I have not been able to hear over the radio whether or not Wilkins reached Spitsbergen and we are all in suspense.

Respectfully,
LEON S. VINCENT,
Government Teacher, Barrow, Alaska.

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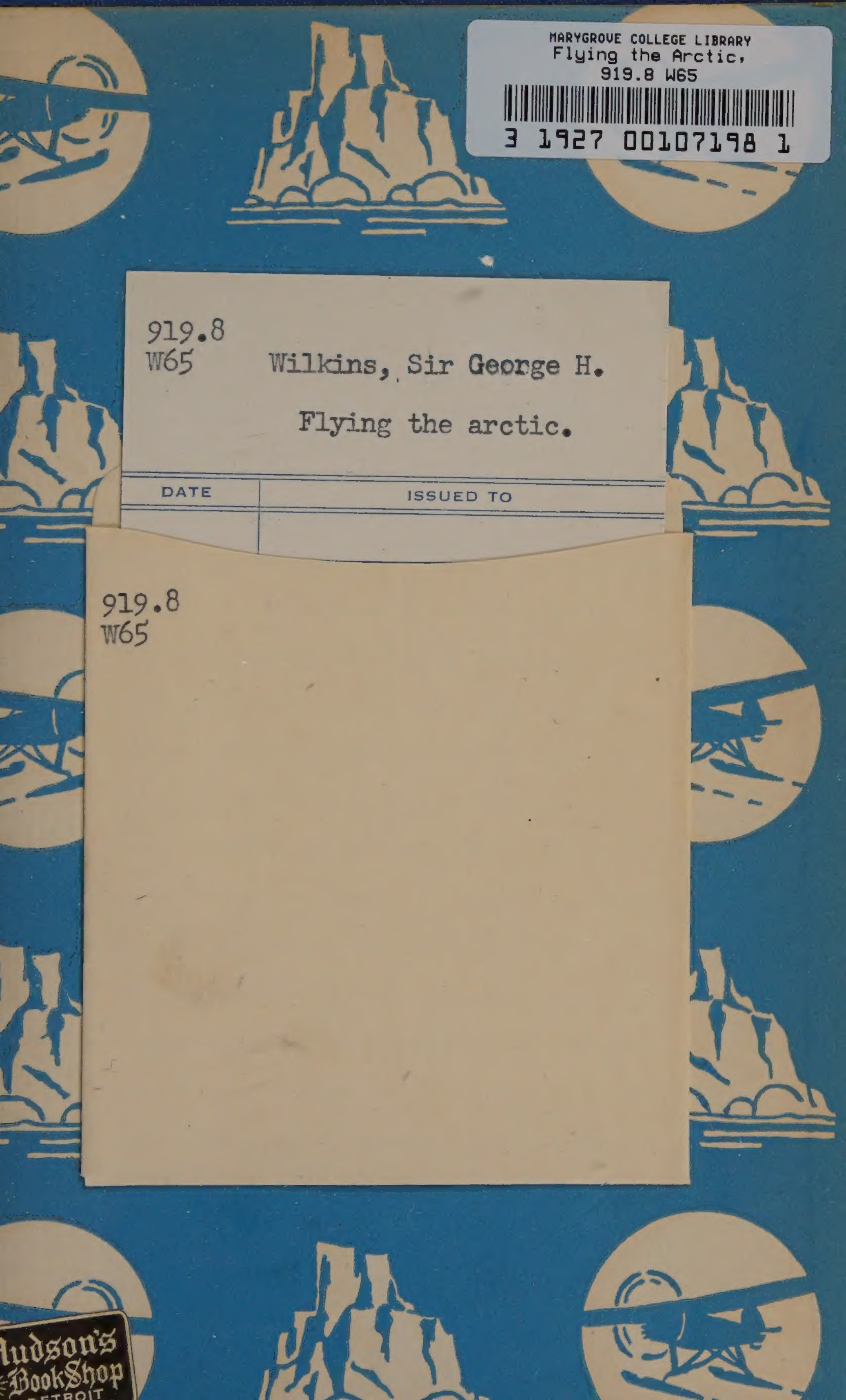

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